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# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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Vol. L

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No. 5

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## Engineers Debate Brake Design at Annual Meeting

Opinions differ on need for equalization. French expert says it is unnecessary. Leather test results surprising. Bright future for motor bus is predicted.

By Norman G. Shidle

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**T**HE opening of the Chicago Show and the annual meeting of the Society of Automotive Engineers were the outstanding automotive events last week. Large crowds thronged the Coliseum to see the latest products of the industry, and there were early indications of brisk buying.

A complete story of the Chicago Show begins on page 247 of this issue.

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**S**HARP differences of opinion regarding certain features of four-wheel brake design, some rather startling revelations concerning the durability of various types of leather and an unusual interest in the problems of commercial aeronautics were outstanding features of the annual meeting of the Society of Automotive Engineers held in Detroit, Jan. 22-25.

The tendency on the part of production men to recognize more fully than ever the important part played by individual responsibility in raising the level of efficiency was another interesting point developed at the meeting. This idea ran through E. H. Tingley's talk on reducing costs by efficient management and was emphasized in various ways by other speakers in their discussions of manufacturing processes.

Efforts of the U. S. Chamber of Commerce to promote better coordination of various transport agencies were given further impetus at this gathering of engineers, when the basic principles adopted by the

recent National Transportation Conference in Washington were approved by practically every speaker in the transportation sessions.

Attendance at the convention, the first annual meeting ever held outside of New York City, was nearly 1000, while the number at individual sessions varied all the way from 60 at some of the less popular ones to more than 500 at the brake session which drew the largest crowd. The convention was held at the General Motors Building.

As evidenced by the number listening to the various papers, the engineers are most interested just now in brakes, fuel research, body construction materials and methods, and commercial aviation. The relatively small groups which heard some of the production discussions probably resulted from the fact that these papers came at the end of a four-day session almost every minute of which had been packed with interesting meetings of one kind or another.

Disagreement about the necessity for equalization



*A group of engineers examining the decelerometers developed at the Bureau of Standards, and other apparatus used in connection with W. S. James' paper on brake performance*

of four-wheel brakes arose early in the discussion of Henri Perrot's paper, the French expert having denied the necessity for equalizing devices. J. G. Vincent, chief engineer, Packard Motor Car Co., held a somewhat different view of this matter. T. J. Little, Jr., said that a careful study of Mr. Perrot's statements has led him to agree with them in nearly every particular.

American engineers took advantage of their opportunity to cross-question the man who has had so much to do with four-wheel brake development, and Mr. Perrot answered the various questions put to him in a genial, specific and frank manner.

Considerable interest was evinced in the new device for testing braking and skidding characteristics which W. S. James, Bureau of Standards, had set up for inspection. Mr. James also showed a new type of decelerometer developed specially for use by municipalities in making brake tests.

The discussion of fuel research also was given added interest by the display of a new apparatus, arranged by Thomas Midgley, Jr., and which he has developed at the General Motors Research Laboratory for measuring the radiant energy liberated during fuel combustion in an engine cylinder.

An unusually large number of prominent engineers took part in the discussion which followed the presentation of papers on carburetor and manifold design and a great many very practical suggestions resulted.

Body engineers seem to be thinking chiefly about materials of construction and production methods rather than about body lines and types of design. Throughout the body sessions the growing importance of adequate material specifications and more careful consideration of quality as well as price in buying was emphasized. That this tendency is worth encouraging is indicated by the statement of E. H. Tingley that 52 per cent of all expenditures at the Delco Light plant are for materials. Similar conditions exist elsewhere, so it is evident that a small saving in buying a unit of materials may affect final cost to a marked extent.

Results of leather tests, recently made by K. L. Herrmann and presented by him in a paper at the body session, were so different from the usual conceptions on

this subject that his statements were received with skepticism by some of the engineers. It was the general opinion, however, that the tests had been made under such circumstances as to render them worthy of the most serious consideration. Mr. Herrmann's tests indicated that grain leather is not superior to split leather for purposes of car upholstery.

The transportation sessions, dealing both with trucks and buses, revealed unanimity of opinion among engineers as to the desirability of coordinating more fully the various types of carrier. The question as to just how such coordination can be effected most readily seemed to be unanswered in the mind of almost every speaker. Numerous examples were cited, however, of successful cooperation in specific cases, indicating that real progress is being made toward a concrete solution of this perplexing problem.

The unusually large crowd which went to the aeronautic session on the opening day of the meeting was well repaid for its interest. Not only did it get some interesting information about the latest developments in the dirigible and airplane fields, but it listened to a thoroughly human and lively discussion of the condition of commercial aviation as it exists today in the United States. The crowd at this session included a great many prominent passenger car engineers as well as the men more intimately connected with the aviation field.

#### Financial Condition

The financial report of the Society showed a net increase of unexpended income of \$32,298.08 over the same period last year, the gain being due very largely to greater revenue from the JOURNAL. Membership slipped off slightly, however, during the same period, the 1922 total having been 5114 as against 5053 at the end of 1923.

Reorganization of sections is under way and a committee headed by former president B. B. Bachman has been entrusted with the task of finding the most practicable plan for future operation. It is probable that members will be permitted to include section dues on the same check with those of the parent society when they so desire.



The next summer meeting will not be at White Sulphur Springs, M. P. Rumney, chairman of the meetings committee, stated in his report. Despite the desire of many members, Mr. Rumney said, return to this site is not feasible because one of the hotels has been torn down and facilities now are inadequate.

Brig.-Gen. C. L'H. Ruggles, in a talk preceding the business session, outlined the plans of the Ordnance Department for coordination of industrial and military activities in war time. He showed how the country has been divided into ordnance districts, each with a district director. The director may remain a civilian or become a reserve officer. This organization already is functioning and would be ready for instant activity if necessary.

To make possible more rapid action if war is declared forms for Government contracts already are being drawn up. They are being made flexible enough to be negotiated during peace time and become effective automatically if war breaks out.

Brig.-Gen. J. W. Joyes presented an interesting motion picture showing new ordnance material in action and outlined recent development work.

The carnival was held on Wednesday evening at Oriole Terrace and was attended by as many members as could get reservations. The committee which arranged the carnival was in charge of George H. Hunt, Beneke & Kropf Mfg. Co.

Special committees handled the arrangement of the program for each of the various sessions. The committee in charge of the body engineering session was headed by A. L. Knapp, Packard Motor Co.; the truck and bus committee by F. C. Horner, General Motors Corp.; the fuel and passenger car committee by T. J. Litle, Jr., Ford Motor Co., Lincoln Division; the production committee by K. L. Herrmann, Studebaker Corp.; and the aeronautic committee by E. P. Warner, Massachusetts Institute of Technology. M. P. Rumney is chairman of the general meetings committee.

## Disagreement Arises on Brake Equalization

*Perrot says it is unnecessary and is backed by some American engineers, but others think it essential. W. S. James shows new instrument for preliminary study of skidding characteristics.*

By W. L. Carver

INTEREST in the engineering aspects of the brake situation has not decreased since the semi-annual meeting of the Society at Spring Lake last summer. Attendance at the Detroit brake session, somewhat over 500, exceeded that of the previous meeting. The meeting was presided over by W. R. Strickland and interest was extremely keen throughout the session, which was featured by the presence of Henri Perrot, who is widely known as the inventor of the four-wheel brake system bearing his name.

W. S. James, Bureau of Standards, showed a new instrument which has been developed to aid in studying braking and skidding characteristics and outlined the results of tests made with his decelerometer. G. L. Smith discussed balanced braking forces.

In addition to the presentation of his comprehensive paper, Mr. Perrot entered into a discussion of the various aspects of four-wheel braking with engineers from several prominent American car factories. The feature of this discussion was his statement that American engineers have not yet availed themselves of the full value of four-wheel brakes. In the commercial sense, Mr. Perrot stated, this policy is commendable, as too rapid a transition cannot be made from the older system to all of the possibilities of the new. The public's attitude must be respected and too great haste might jeopardize the buyer's respect for a real engineering advance.

During the discussion he reiterated his advocacy of the system of inter-connecting the front brake on one side of the car with the rear brake on the other side, stating that when this arrangement is used in conjunction with his principle of releasing the outer front brake while turning,

a greater degree of safety is assured. As further advantages of this arrangement, he advanced the elimination of equalizers and separate hand-braking systems, and demonstrated that although three of the four brake rods are disconnected, some braking ability remains. When drums of sufficient hardness and brake lining of uniform characteristics are utilized, the need for equalizers is slight as the system remains in correct operating condition for extended periods and may be adjusted readily at the wheels.

Mr. Perrot also advocated greater use of self-energizing or internal wrapping brakes in preference to the external type for reasons of greater cleanliness of design and freedom from the effects of dust, water and mud. Some form of self-energizing brakes is to be preferred to the complexities of the servo-mech-

anism, he said. As to the ratio of pressures between the front and rear systems, he stated that practically every foreign manufacturer having much four-wheel brake experience has adopted a 50-50 ratio for the regular output. In racing cars, where retardation rather than total stopping is the chief function of the system, the usual ratio is



Henri Perrot, whose paper on four-wheel brakes was the subject of much favorable comment

65 per cent for the front wheels and 35 per cent for the rear wheels. In addition, Mr. Perrot stated that in his opinion much more work remains to be done on the steering gear and spring suspension than on four-wheel brakes.

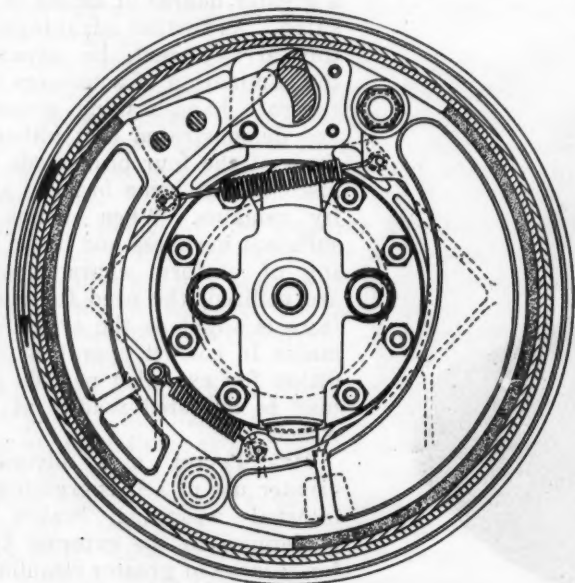
## Perrot Gives Ideas on Four-Wheel Brake Design

**S**ATISFACTORY operation from the standpoint of the driver is the chief point to be considered in four-wheel brake design, Mr. Perrot said. Pedal travel and pedal pressure, however, are limiting factors. A part of Mr. Perrot's paper follows:

The real problem of four-wheel brakes is one of obtaining satisfactory brake operation from the point of view of the driver, with two limiting factors to be considered. These factors are, first, the pedal travel, which preferably should not be more than 5 in., of which one-half should be sufficient for full brake-operation when the car is newly adjusted and the other half of which should be available for wear prior to readjustment.

The other factor is pedal pressure, which I believe should be limited to a maximum of 50 lb. under normal conditions. This means that not more than 50 lb. should be necessary for maximum braking under all ordinary conditions of road travel, though, at times, a possibility exists that somewhat more pressure might be necessary in an emergency.

Too great pressure is very bad; but too light pressure is, I believe, worse in some ways because, under conditions of stress, the operator of the brake, especially with a power servo mechanism is likely to apply the brakes so hard as to decrease their effectiveness by locking the wheels. I am impressed by the desire of engineers in this country to lock the wheels at relatively low pedal pressures. I realize



*Perrot-Farman servo-brake*

that this is due in a considerable degree to what is now a public demand, but I believe that the public should be educated to discard what is an absolutely wrong idea.

I am not yet altogether ready to give up my belief that, as applied to a tire rotating on the road against one skidding on the road, the friction of rest is greater than the friction of motion, which is apparently disproved by the experiments of W. S. James of the Bureau of Standards. Certainly, my driving experience does not lead

me to agree with this new theory and, entirely aside from which condition gives the greater braking effect, locking the wheels and skidding the tires is undoubtedly very bad for the tires themselves. One of the objects of four-wheel braking is to reduce tire wear.

I do not believe that the problem of four-wheel brakes can be solved with the conventional, internal expanding brakes without some kind of servo mechanism. The reason for this is that excessive pedal-pressure is required; or, if sufficient leverage is given to make the pedal-pressure reasonable, the pedal travel is too great or adjustment is required too frequently.

### Servo Mechanisms Evaluated

There are several successful servo mechanisms using power to apply the brakes, the brake-pedal being used simply as a means of actuating the servo mechanism. The best known of these are the Birkigt on Hispano and Delage, the Hallot on Chenard-Walcker, and the Renault. The Birkigt and Renault types are nearly alike. The Hallot device is based on the use of centrifugal force; it claims to be a satisfactory device in giving maximum braking without locking the wheels. The Delage is an hydraulic servo mechanism, the power of the hydraulic system being obtained by a gear pump in the gearset.

All these mechanisms are expensive and complicated, and I have felt that simpler methods of obtaining a result equally satisfactory to the driver should be provided. In the past three years, I have been working with the chief engineer of the Farman Co. in the development of a self-contained servo brake.

This brake has been variously designated as an internal-expanding, self-wrapping or self-energizing brake, or as a self-contained servo brake. It is an effective mechanism, and I have no hesitation in saying that it solves the problem of the direct pedal operated four-wheel brake on the standard passenger vehicle.

In developing this brake we began by studying the self wrapping internal expanding band brake. We tried this with not only full wraps but with various portions of the full wrap, developing the band from a thin steel band to one that was about  $\frac{3}{8}$  in. thick, which was found to be required so that the band would hold its circularity and relieve itself nearly automatically.

This heavy type of band brake gave good results, but we found that we had lost most of the benefit of the self-wrapping feature owing to the relatively high pedal-pressure that was required to operate a steel ring of such thickness. The next step was to use two solid shoes with a hinge, practically the same as our present construction. A number of small details were found to be most important, and a considerable amount of development work was required before we knew the proper relative positions of the fixed point, the hinge point and the cam to get the best results.

The same results that have been obtained with the Perrot-Farman servo brake can be obtained with external contracting brakes, especially when the latter are new. Internal expanding brakes are to be preferred because the external contracting brake requires more clearance and it is practically impossible to keep the bands truly circular. Under varying conditions of heat, moisture and dirt, the action of these brakes varies greatly and when these brakes are made to be efficient, they appear to me to lock the wheels too easily. I also feel, from considerable experience with this type of brake, that the external contracting brake does not allow of the progressive brake application from nothing to the maximum which is possible with the internal expanding types.

Objections are raised to the internal expanding types; first, that they have to be made more accurately. This is



true. Less clearance is necessary to give good service, but the smaller tolerance can be obtained easily and inexpensively and the resulting mechanism is superior to the external brake, having much longer life between adjustments. A single adjustment only is required and that on the lever on the controls. Practically the same adjustment can be arranged for internal expanding brakes of the standard type on the rear, so that the driver has only to turn a simple wing nut with his fingers to make the adjustment. This method is undoubtedly very much simpler than the methods that appear to be necessary in adjusting external contracting brakes.

The outside diameter of the drum on an internal expanding brake is the maximum diameter that is to be cared for when road clearance is considered. For this reason, internal expanding brakes will be the only possible brakes if balloon tires or smaller wheels become standard, as appears to be entirely possible. Furthermore, when chains are used, they may become entangled on external brake parts and cause serious trouble.

American experience with internal expanding brakes is mainly with this brake when used on the same drum with the external contracting brake. I feel that the internal expanding brake, as used in America as an emergency brake, has had very little attention paid to it and, therefore, that the prejudice against this type of brake is due rather to inattention than to an objection to a thoroughly tried out mechanism.

#### Advantages of Perrot System

At present, in Europe, no car is turned out with external contracting brakes. It is true that greater leverage is necessary with the standard internal expanding brake, but this leverage is allowable because of the much smaller clearances that can be used on this type because of its better protection and cooling.

Advantages of the Perrot braking system are:

- (1) Braking effort has practically no effect on the steering, even when the brakes are out of adjustment. This is due to the use of inclined king pins and approximate center point steering.
- (2) The design of controls allows practically any amount of steering-lock, without constructional difficulties.
- (3) This system makes possible the differential action that slightly relieves the braking effort on the outside front brake when turning a curve.
- (4) Owing to the fact that the brake mechanism is carried by the chassis up to a point opposite the brake cam, and the braking effort is taken across by a torque shaft, "fight" on the brake pedal on rough roads is practically eliminated.
- (5) Brakes continue to function even with a distorted axle or partly broken spring.
- (6) Layout of design makes it possible to utilize any shape of cam, making the Perrot-Farman servo brake, with its self energizing shoes, easier of application.
- (7) Position of the brake mechanism is such that it is protected thoroughly from road inequalities.
- (8) The operating mechanism is totally inclosed.

Perrot-Farman front servo brakes can be made more simple and less expensive than the standard internal expanding brake. Controls modified, to make them inexpensive in production, are today better than my latest French designs.

Special care will need to be exercised to see that the design of the internal expanding brake is brought up-to-date so that it will be effective. Clearances must be kept down. The cam must be constructed so as to assure the equal application of both shoes. This is something that actually is accomplished very seldom.

Brake connections must be ample in size so that there shall be minimum slack and spring to take-up. These connections may either be solid without equalizers and with really easy adjustment as close as possible to each brake, or they may be diagonal braking connections with the one equalizer thus necessitated and equally easy adjustments. Which of these should be used is a matter of judgment that can be worked out for the individual case. The main thing to be brought out is the solidity of the connections and the reduction of the parts to the minimum, so as to assure the highest possible mechanical efficiency from the brake-pedal to the actuating cam.

With a layout such as this, I am convinced that it is entirely satisfactory to have four brakes only, on four sepa-



W. R. Strickland, Cadillac Motor Car Co., presided at the brake session

George L. Smith read a paper on "Theory and Advantages of Balanced Brake Forces"

R. H. Jack, Olds Motor Car Co., prominent in discussion of four-wheel brakes

rate drums and all operated by pedal. The hand brake is to be connected to the same shoes, either on all four or on the rear shoes, by a communicator. Such a layout now is employed in Europe and is admitted to be in compliance with the law.

With the solid layout, it is possible to break the connections to three brakes and still have one brake acting. With the diagonal braking-layout, two brakes can be thrown out of commission and still have two brakes operating. With relatively simple stops on the equalizer, it would be possible to break three connections and still have braking effect on the fourth drum. This system, while it requires four brakes instead of five or six, is certainly as effective as any other direct action braking system and, owing to its simplicity, undoubtedly is cheap to manufacture and light, especially in unsprung weight.

#### Brake Drums Important

In designing a braking system for any car, a number of points must be taken into consideration, especially those that influence the selection of the material that is used. Brake drums are very important. If an inexpensive brake drum is not the prime object and the best is wanted, the die cast aluminum drum with a cast iron liner undoubtedly is the most effective type that has been constructed to date.

Aluminum has the heat radiating ability, and the cast iron liner is known to offer the most nearly perfect braking surface. Care must be used, of course, to make the aluminum drum of the proper section, so that it will not distort and will dissipate heat quickly. If expense is a primary limit in manufacture, steel drums can be used satisfactorily; but they must be made of rather high carbon steel and heat treated, if long service is to be obtained from the brake fabric.

Linings for internal expanding brakes should not be the



(Right) W. S. James of the Bureau of Standards, discussing brake tests with W. R. Griswold of the Packard Motor Car Co.

same as those for external contracting brakes, and must be made to suit the work that they are to do. On the best cars in Europe we are using Ferodo die pressed brake lining, and the surface of the lining is ground to size on a jig after it has been riveted to the shoes. The successful type of brake-lining for a given drum material may not be at all successful with another type of drum material. The effect of Ferodo on steels of different carbon content is a case in point.

Front springs, when laid out for four-wheel brake cars, must be materially different from the springs for the car equipped with two-wheel brakes. It should be remembered that the front springs are obliged to absorb the torsion set up by the front wheel braking effect. For this reason, the spring eyes must be made carefully and reinforced. The second leaf of the spring should be carried out to a point under the spring eye, and the spring itself should be calculated to be a little stiffer than on the normal two-wheel brake car. In comparing brakes on different four-wheel brake cars, the rate of deflection of the front spring must be taken into consideration.

#### Design for Safety

As a matter of precaution, with four-wheel brakes, a small stop should be placed on the lower side of the frame member back of the rear end of the front spring so that, in case of a broken spring, the backward travel of the front axle body can be limited. The U-bolts holding the spring on the axle bed, the spring clips, and the front axle center must be designed to take care of the new stresses introduced.

Inclined king pins are, of course, absolutely necessary. It is now our practice in Europe to use an elliptical section from near the outside of the spring bed to the king pin. It will be found that such an axle can be designed with a very small increase of weight, and is easier to forge than the standard H-section axle. The designer should take real precautions to protect the brake lining against oil from the king pins and the axle bearings.

Covers should be built to give the maximum protection against water, mud, dust and the like. The brake connections should be made by adequately sized rods and not by cable. Cable can be purchased that is reasonably effective, but it all has some stretch; the replacements made in the garage are usually of poor material and may cause serious trouble.

My reasons for not using equalizers are simple, but I believe they are sound. They are as follows:

- (1) The equalizers add to the number of parts and reduce the mechanical efficiency of the system.
- (2) Equalizers do nothing more nor less than equalize the braking effort and do not in any way equalize the braking effect, even provided they operate properly, which is very often not the case.
- (3) With four-wheel brakes, the braking effort is spread over at least twice as much braking surface and the wear is bound to be very much smaller; so, with easy adjustments on the brakes themselves, equalization is a useless added complication that seldom does any good.

The following points should be watched carefully in making front wheel brake layouts:

- (1) *King-Pin Angle.*—In some ways the ideal would be a vertical king-pin in a centrally pivoted front wheel. The drawback to this construction is the difficulty of overcoming wheel shimmy. The king pin angle should be kept as small as possible so as to provide easy steering. For this reason, the disk wheel is even more advisable as, if the king pin is not nearly vertical, the steering becomes so heavy as to be laborious. If balloon tires become standard, the disk wheel will increase in popularity for the same reason.
- (2) *Exact Center-Point Layout.*—Makes steering more difficult when the car is standing still, there being no relative rolling action set-up. The plain twisting action is hard on the tires. With true center-point steering, it is very difficult indeed to eliminate wheel wobble or shimmy at some or all speeds. The point of contact of the king pin center-line with the road should be inside of the surface of tire contact.
- (3) *Castering Angle.*—There should be a slight castering angle, but this must be very small so as to avoid shimmy; its allowable amount will vary with the camber and the rate of deflection of the front springs.
- (4) *Influence of Steering Gears on Steering.*—It has been my experience that it is more difficult to get really steady steering with the screw and nut type than with the worm and wheel type of steering gear. I have had more difficulty in curing wheel wobble on cars that had the front axles fitted with ball bearings than when they were fitted with plain bearings. With plain bearings, a neater design of stub axle can be made and, usually, the king pin angle can be lowered.
- (5) *Front Springs.*—The front springs should be as nearly flat as possible to give the best results. Only a slight camber is allowable. With excessively soft springs, the slight caster that is advisable in any good design can be taken out completely with a severe application of the brakes, and an anti-castering action may be introduced. The result of such an anti-castering action is fatal to the steering system of a car.
- (6) *Influence of Front Wheel Brakes and Balloon Tires on Steering.*—This influence is a very considerable one and necessitates a much more careful study of the steering gear itself, on account of the small extra resistance set up by proper front wheel brakes and the much greater resistance set up by balloon tires. Putting it briefly, four wheel brakes and balloon tires will necessitate new steering gears.
- (7) *Test for Quality of Front Wheel Braking.*—On any new type of car, the easiest way to prove or disprove the quality of the front wheel braking system combined with the steering, springing and the like, is to take off all the brakes except one front wheel brake and test the car with this one front brake in action. If the layout is right it will be perfectly possible to apply the brake fairly hard with only a slight pull on the steering wheel.



I believe that we will revise front spring suspensions entirely. I know of a considerable amount of experimental work now going on, and this is due directly to the new problems set up by four-wheel brakes. Second I believe that a very considerable modification will be made in the design of the front and the rear wheels. This is due to the appearance of the balloon tire and the success of the disk wheel.

## New Method Developed for Brake Equalization

IN his paper on "The Theory and Advantages of Balanced Brake Forces," George L. Smith, designing engineer of the U. S. Ordnance Co., explained the two methods of equalizing braking effects on wheels on opposite sides of the car that are now in vogue, and then described a method developed by himself and claimed to be superior to both. The present methods consist (1) in inserting a balance lever or equivalent device in the brake operating linkage and (2) in carefully adjusting the linkage to each brake. Both methods have the defect that they do not allow for variations in the coefficient of friction between the brake bands and drums, which is claimed to vary within wide limits within short intervals.

What is really desired is not equalization of the pull on the brake levers or of the torque on the brake cams, but of the frictional forces between the brake bands or shoes and their drums. In the author's system these frictional forces are equalized. The principle involved is that two equal and opposite forces neutralize each other and produce no movement, whereas unequal opposing forces produce movement. The system was described in the paper as follows:

"In a brake anchored at some intermediate point between the ends thereof, with the brake-setting mechanism producing no appreciable resistance to rotation, it is evi-

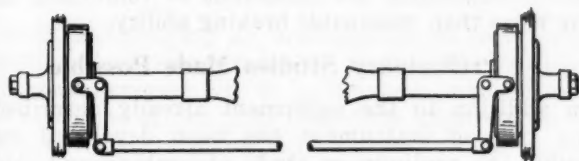


Fig. 1—Brake system in which each brake pulls against the other. In this design the brake exerting the greatest pull will rotate with the drum and will cause the other to rotate in the opposite direction

dent that the anchor will resist the entire force  $F$  of the brake. If this anchoring means is constructed so that each brake pulls against the other, by a system of bell-cranks and a connecting-rod as shown in Fig. 1, then the brake exerting the greatest pull will rotate with the drum and cause the other to rotate in the opposite direction.

This rotary movement can be made to vary the brake pressure as seen from a study of Fig. 2. The compensating link  $l$  swings up or down, as the case may be, carrying the pivot  $a$  along the arc  $b$ ; but, to produce no variation in the band pressure, the pivot  $a$  would have to travel on the arc  $c$  struck from the center  $o$ . Consequently, forward rotation of the band swings the pivot  $a$  down and in, thus easing-up on the toggle lever and slackening the band pressure. Backward rotation, on the other hand, will swing the pivot  $a$  up and out and tighten the band pressure.

"The direction of the thrust of the compensating link will also produce a slight rotary force on the band which increases the resistance exerted by the anchoring means

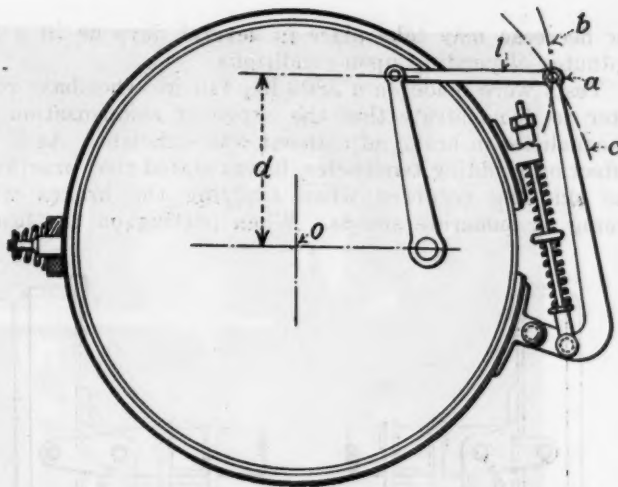


Fig. 2—How the rotary movement of the brake-band can be made to vary the brake pressure. The up-and-down movement of the compensating link  $l$  causes the pivot  $a$  to move along the arc  $b$ , but to maintain the brake pressure constant the pivot would have to travel on the arc  $c$  having its center at  $o$ . Consequently forward rotation of the band swings the pivot  $a$  down and in, thus easing up on the toggle lever and releasing the pressure on the brake-band. Rotation in the opposite direction tends to swing the pivot up and increase the pressure on the brake-band

and, since this thrust will not be the same on each side unless the coefficient of friction on each side is the same, there will be theoretically incomplete equalization of the two brake-forces. This factor is a small one, however. Likewise the action of the separator springs bearing on both sides of the brake support detracts slightly from theoretically perfect equalization but, in practice, this factor is also negligible, being such a small percentage of the total forces in action.

"By reference to Fig. 2, it will be noted that the compensating links must pass above the axle center to obtain an equalizing action for retarding forward movement of the car. With a reverse rotation of the drum as in backing, the action of these links will be reversed; the brake pulling the hardest will rotate backward with the drum and the pressure will be increased, while the brake on the other side will rotate forward against the direction of rotation of its drum and the pressure will be released. So, the result is complete equalization of forces.

### Backing Latches Necessary

"Hence it is necessary to employ the backing latches  $t$  shown in Fig. 3. The drawing at the left shows the latch engaged, its normal position with the brakes off, or with the brakes applied in backing, in which latter case the latch and not the equalizer rod resists the force of the brakes. In the drawing at the right the latch is shown disengaged by the tension on the equalizer rod, the latter being raised bodily until all four pivots, latch to bell-cranks and latch to rod, are in the same line.

"It is thus evident that the latches perform two functions, that of centering the equalizing mechanism when the brakes are off, and of rendering it inoperative when retarding a rearward movement of the car."

According to the author, the utility of an equalizing mechanism of the above type depends principally upon the degree of reliability of the frictional characteristics of the brake-lining. With  $f$  a constant, its usefulness drops to zero. Investigation of this subject developed the fact, however, that  $f$  is a decided variable, sometimes as low as 0.13 and sometimes as high as 0.52, and that its rate of change is also exceedingly variable. The same increase

or decrease may take place in several days or in a few minutes, depending upon conditions.

Tests were made on a 2800 lb., 119 in. wheelbase roadster to demonstrate that the range of compensation for inequalities in brake adjustment was sufficient. As to the effect on skidding tendencies, it was stated that practically no skidding occurred when applying the brakes while going at moderate speeds. When putting on the brakes

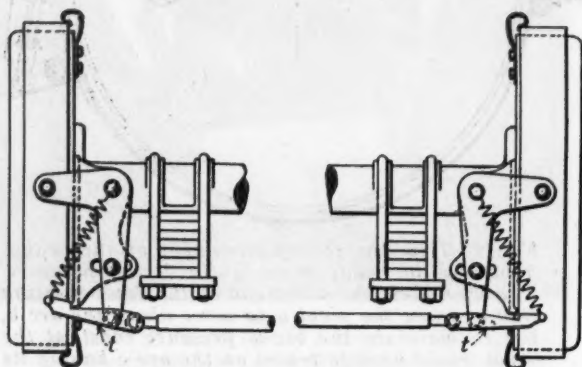


Fig. 3—Backing latches employed to center the equalizing mechanism when the brakes are released and rendering it inoperative in retarding backward movement of the car. The drawing at the left shows the latch engaged, which is its normal position with the brakes off or the brakes applied in backing, in which latter case the latch resists the force of the brakes. In the drawing at the right the tension on the equalizer rod has disengaged the latch, the former having been raised bodily until all four pivots, the latch to the bellcrank and the latch to the equalizer rod, are in the same straight line

while running at high speed, a sort of pendulum action took place, the car first slewing around to one side through an angle of 10 or 15 deg. and then to the other side through a slightly smaller angle. It was found impossible to skid the car intentionally. All these tests with regard to skidding were made on wet pavement. The following advantages are claimed for this method of brake equalization:

The rear wheels do not lock easily, as it is seldom that one locks without the other locking also; consequently, very little rubber is dragged off the tires in this way. Much more uniform and effective brake action was noted soon after the equalizer was applied and, on long trips, less variation in the power of the brakes was noted.

The brake-lining wear appears to be more uniform and the tendency to wear down at the ends is entirely eliminated, the maximum wear taking place along the upper and rear portion about 15 to 30 deg. to the left of the top.

Applied to front wheel brakes the equalizing system is claimed not only to give practically perfect equalization of braking effect, but also to relieve the steering gear of all braking strains. The only exception is when one of the brakes is so far out of adjustment that the equalizer rod bears against a limit stop, in which case the mechanism will give the driver an audible warning that his brakes require adjustment.

In discussion of the paper, Smith stated that a movement of  $\frac{3}{8}$  in. at the upper ends of the compensating levers has proved more than sufficient to take care of the frictional variation of existing brake lining. The same limitation permits equalization when one brake adjusting screw is tightened three turns and the other is released a like amount. Equalization is obtained also when one band is water-soaked. He stated that this device is applicable to internal brakes as well as external, although the design is not quite as clean in the former case. In

response to a query regarding the action of the device when installed with brakes which are inclined to chatter and grab, he averred that the slight travel which takes place at the band upon engagement has eliminated these characteristics.

## Result of Brake Action is Shown by Experiments

**B**RAKE action, as the force which acts opposite to the car's direction to produce retardation, was discussed in conjunction with instruments developed recently at the Bureau of Standards by W. S. James in his paper, Brake Performance Studies. A complete description of this instrument with much of the data presented appeared in AUTOMOTIVE INDUSTRIES of November 29, 1923. More recent research along the lines of practical brake tests, particularly where the driver is required to apply the brakes upon signal or command, has proved that a variable depending upon the driver's reaction exists. The figures developed show a considerable variation for different individuals and the average for ten tests indicated a lag of 0.42 sec. between the signal or command and the application of the foot brakes. Under similar conditions the lag for hand-brake application is 0.51 sec.

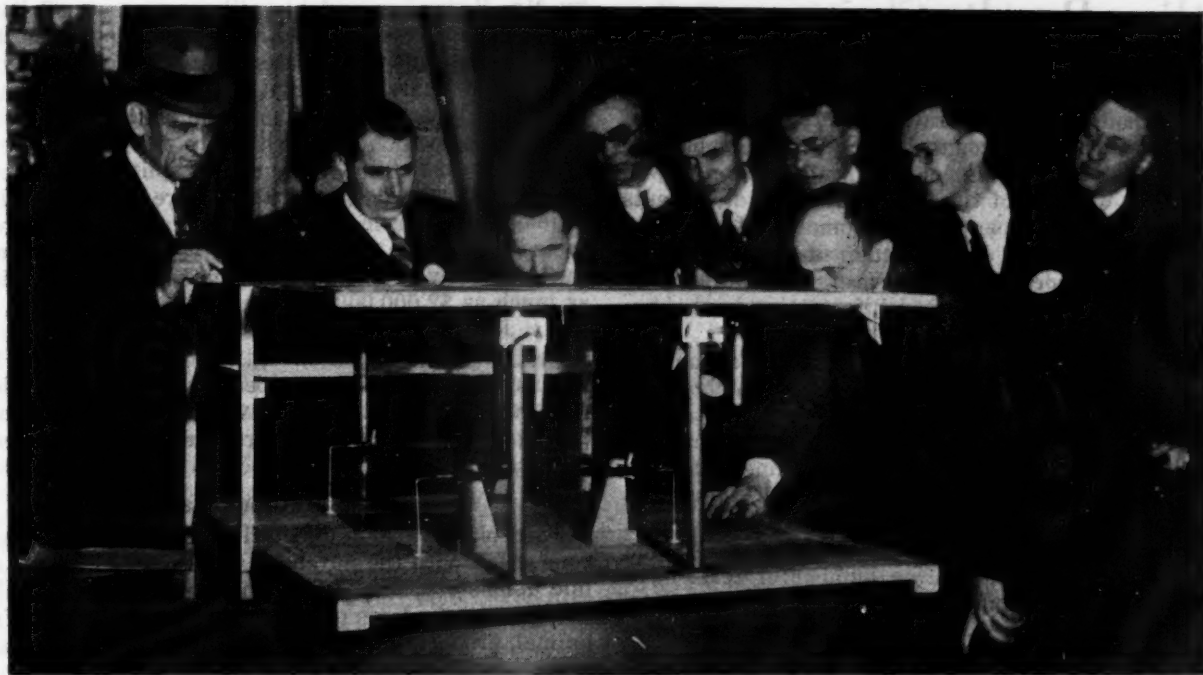
Mr. James also explained three types of instrument which have been developed for quick inspection of brake efficiency by police departments, dealers, etc. These instruments are constructed upon the same principles but are not fitted with recording devices. They have only an indicator showing the rate of deceleration which is practically a constant at all speeds for each individual car. In this connection, emphasis was placed upon the necessity for the Society using its influence in educating police departments and State legislatures as to what constitutes efficient braking standards. Mr. James asserted that some of the standards already adopted and under consideration are impossible of fulfillment and require more than reasonable braking ability.

### Preliminary Studies Made Possible

In addition to the equipment already described another type of instrument has been developed making possible the preliminary study of braking and skidding characteristics while the proposed car is still in the drafting room stage. In this instrument a light dummy framework which is scaled to the wheelbase and tread dimensions of the car is suspended by piano wires at the four corners from a light wood frame. A bob weighing about 2 lb. is positioned on the dummy framework to approximate the location of the center of gravity of the car as related to the four points of wheel support. By modifying the points of support and measuring the angle of the supporting wires the general characteristics of the proposed car pertaining to braking requirements and skidding action can be worked out mathematically in advance. In connection with the description of this instrument, Mr. James pointed out that the ratio of the height of the center of gravity to the wheelbase length runs as high as 0.3 for small cars and averages at about 0.25 for all cars.

Particular enthusiasm for this device was shown by Mr. Perrot, who stated his confidence that it would serve to vindicate his theory of interconnecting the opposite front and rear brakes. He was certain that the visible demonstrations possible with this instrument would serve to convince engineers of the correctness of a theory which he has evolved through long experience.





W. S. James and other members inspecting apparatus built by the Bureau of Standards for studying brake performance

## Tests Give New Facts About Body Materials

*Investigations upset established theories concerning leather. Fresh light shed on characteristics of other products. Cost of production and quality of fabrics chief topics of interest.*

By Herbert Chase

A REPORT covering an investigation as to the suitability of various grades of leather for upholstery purposes prepared by K. L. Herrman and J. F. Radel proved to be one of the most important items on the program in the body sessions. This report tends to upset present practice regarding the relative value of grain and split leathers. Tests made to date indicate that some grades of split leather are much stronger than similar grades of grain leather and will, for this reason, be more durable than grain leather.

It has been found possible also to patch grub holes and other faults in upholstery leather in such a way that the repaired portions are not only stronger than the original piece but cannot be detected even by leather experts through examinations of the finished side of the leather.

There was considerable interest in the proposals made by H. T. Strong looking toward the improvement of closed car interior trimmings. Mr. Strong pointed out that, although trimming material cost is only about 2 per cent of the selling price of closed cars, the character and grade of material used has a pronounced effect upon the salability of the product. Consequently it is poor policy to buy trimming materials solely on a price basis. It was also suggested that much individuality could be secured by a return to the use of broad lace in trimmings.

A belief that casein glues will displace animal and vegetable glues in the near future for body building work was expressed in the paper by W. A. Henderson. The author pointed out numerous advantages of casein glue as compared to that now generally used and made a strong case

for the substitution of casein glue which, he said, has already seen wide use abroad and a somewhat more limited use in this country. The disadvantage of casein glue as used here during the war is said to have been overcome by the development of a casein glue which is free from the adverse effect of dulling sharp edged tools.

A lively discussion followed presentation of Otto Graebner's paper on pre-enameled closed bodies. The success attained thus far in the production of some 5000 coach bodies by this method seems to indicate that it will be applied more generally in the near future, as it results in numerous production economies.

### Drying Troubles

Some difficulty encountered in the use of paint drying ovens, especially with bodies having elm and maple frame work, was the subject of a round table discussion at one of the body sessions. One speaker at this session contended that the difficulties due to shrinkage have been overcome in most cases by employing air with a sufficiently high moisture content to prevent a loss of moisture in the wood during the drying process.

As often happens in the case of papers in which the information given deals with subjects which have received exhaustive study by the author but are comparatively new to the audience, there was but little discussion on certain papers presented. This applied especially to the papers on woods for automobile bodies by A. T. Upson and L. N. Ericksen and that by E. M. Baker on rust resistance of nickel plated steel.

## Startling Results Shown by Leather Research

THE prevalent belief that grain leather, that portion of the hide which is outermost, is the most durable and satisfactory material for upholstery leather is not well founded. This was one of the rather startling statements brought out in the paper on "Automobile Upholstery Leather" presented by K. L. Herrmann of the Studebaker Corp., and F. J. Radel. Both engineers and purchasing agents found a wealth of practical information in the material presented in this discussion.

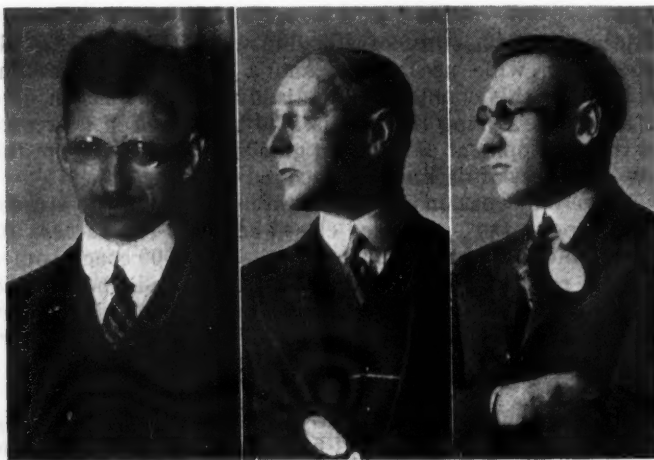
Mr. Herrmann is chairman of an S. A. E. committee which has given much study to the matter of upholstery materials, one result of which has been the specifications for upholstery leather adopted as recommended practice at the Standards Committee meeting. In connection with this work, an investigation as to the qualities of various grades of leather has been conducted.

In reaching the conclusion concerning the relative value of grain and other leather a large number of tests have been conducted by the Bureau of Standards, by various automobile companies and by some leather manufacturers. These tests have sought to determine the physical properties of leather, especially tearing strength and tensile strength, and much to the surprise of the committee as well as to leather men, it has developed that the first and second splits almost invariably are stronger and less easily torn than are the grain leathers now generally employed.

### Splits Can Be Softened

It was reported also that at least one leather manufacturer has found it possible to so cure the first and second splits as to make them as soft and pliable as the grain leathers, which heretofore have been standard for upholstery purposes and have been more carefully treated because of the higher prices which they command.

Another rather startling fact revealed in Mr. Herr-



K. L. Herrmann, Studebaker Corp., who presented results of leather tests

F. A. Henderson, Casein Glue Co., described the qualities of casein glue

Otto Graebner, Widman Body Corp., talked on "Pre-enamelled Closed Bodies"

mann's report was that it is possible to repair cuts and grub holes in upholstery leather in such a way that the repaired portion not only is stronger than the original part, but cannot be detected on the finished side even by men with long experience in judging leather qualities.

It developed that only two or three leather manufacturers are as yet fully satisfied that the conclusions reached

by Mr. Herrmann and his colleagues are sufficiently well established to warrant their general recognition, but it is evident that when they become so established they will result in very marked savings, not only to the leather manufacturers, but to the automobile industry. This is because many hides which formerly were not acceptable can be made acceptable, and because the splits which heretofore have been regarded as inferior are proved to be quite usable. Mr. Herrmann made the statement that when the facts in question gain general recognition the saving to the automotive industry will reach in all probabilities to as much as \$2,000,000 per year.

Mr. Herrmann's paper dealt at length with the classification of hides and their rating. It was shown how, by the use of carefully drawn specifications, automobile manufacturers can effect great savings, especially through securing spready steer hides, rather than cow hides which cut to less advantage.

### Test Methods Lacking

To explain various difficulties which are experienced in connection with the purchase and use of hides for automobile upholstery, Mr. Herrmann dealt in considerable detail with the methods employed in stripping the hide from the animal, preparing it for the tanners and the manufacturing processes through which it is put by the leather manufacturers.

In attempting to prepare a specification, Mr. Herrmann stated that he found no information as to the strength of leather and no means for testing strength in a tannery. "We found great differences in hides of apparently the same strength," he said. "Variations of 400 per cent were common when tests were made on a hand Olsen testing machine. Because an Olsen testing machine was too complex for the tanner, we first proposed the use of a spring balance with a hook which is inserted in a punched hole in the leather to be tested."

In making this test, the leather is pulled until a tear starts. Variations of from 5 to 50 lb. were found in the same hide. Later, a Scott testing machine and also a Perkins tensile tester were employed. Tests made on these machines showed failure on application of from 50 to 350 lb. and elongation in 2 in. of from 18 to 90 per cent. It is hoped that by the use of machines of this character the tanner will be able to learn the cause for unusually tender or weak and unduly flaky leather.

Following the presentation of this paper, Mr. Herrmann showed some machines for leather testing which had been used or developed by the Studebaker Corp. In one of these, the leather is flexed when held by a weight at the lower end and in another a strip of the leather made up in the form of a belt is run over pulleys and under a friction surface. This apparatus is expected to assist in determining various qualities of the leather but it has not yet been in use a sufficient length of time to reach any final conclusions.

In the discussion of the Herrmann-Radel paper, it developed that conclusions as to the ultimate satisfaction which will be obtained by the use of split as compared to grain leather must wait upon completion of durability tests in actual service over a period of several years. It was stated, however, that service tests made over a period of some nine months have indicated that some of the split leather tested is in better condition at the end of nine months in service than are samples of the more expensive grain leathers tested under similar conditions.

George W. Kerr voiced the sentiment of some of those present when he stated that the astounding conclusions reached by Herrmann are so contrary to the experience of body builders extending over a period of a great many years that they should be accepted with caution. Mr. Kerr said that experience had proved grain leather to be



much better than splits, and that the mechanical strength as revealed by a testing apparatus is not the only factor to be considered. Only service tests extending over several years can be regarded as conclusive.

In reply, Mr. Herrmann stated that he does not expect 100 per cent acceptance of his conclusions, but feels that the chances of their being correct are about 99 to 1, and that they will in time gain general recognition. According to tests made to-date, it has been shown that split leathers can be made to have as good a "feel" as grain leathers and that the former last as much as three times as long as the latter.

In response to other questions, Mr. Herrmann indicated that it is not the purpose of the S. A. E. committee to stipulate by what methods hides shall be tanned or finished. The committee will base their conclusions upon performance rather than upon a specific manufacturing method.

He said that the committee is not only willing but eager to help the tanner to produce a more satisfactory as well as a more uniform product.

In concluding the discussion, L. Clayton Hill, who acted as chairman of the meeting, laid emphasis on the fact that if we accept present methods as being entirely satisfactory, no progress in developing better methods or material will be made.

## Ornate Body Interiors Urged as Sales Feature

MOST of the body engineers manifested a marked interest in the paper by H. T. Strong devoted to the subject of body trimming materials and style. In the course of his paper, Mr. Strong made some simple demonstrations of methods used in determining the wool content of fabric and of weighing the fabrics in an approved manner. His paper dealt with the nature and properties of various materials as well as with the method of manufacture. A summary and some excerpts from this paper follow:

Wool is the shortest staple fiber taken from the fleece of the sheep. Worsted is the long, wiry fiber carded out of the wool and put through a different process to finish, while all genuine mohair comes from the long, wiry haired angora goat.

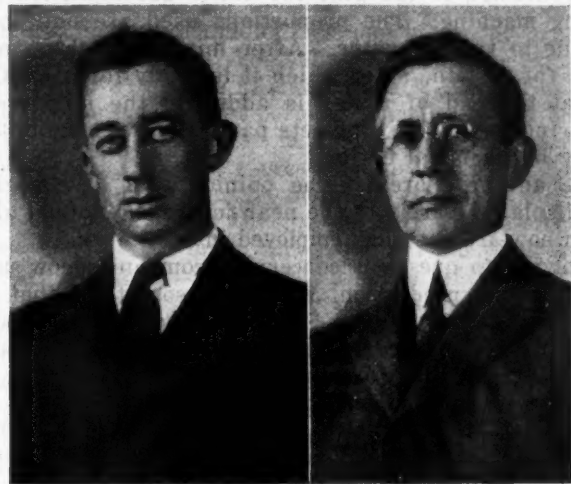
It has been found that worsted wears better, does not hold the dust and stays in shape better than wool. For these reasons many experiments have been made with worsted fabric for automobile upholstery and a great step forward has been made in their adoption, especially for sedan and coupe type of owner driven cars.

The cycle of extreme plainness in interior-trimmings has now covered a period of several years and customers and manufacturers alike are wondering if it is not time for a change to more elaborately decorated interiors. There is a sales reason for this which all branches of the industry should realize. If the prospective purchaser sees in a showroom a car which looks, as far as interior trimmings go, like the one he bought two or three years ago, he has less desire to purchase a new car. For this reason, it seems that a change should be made in interior upholstery every few years in order to assist sales.

The era of plain upholstery certainly has had its day and something should be done at once in an effort to change the appearance of the interior of our better grade cars. One of the best ways to bring back a more ornate interior is by the use of broad lace in the more expensive cars, semi-broad lace in moderately priced cars and also decorative pasting lace and plain seaming lace.

By the use of figured materials for the cushions, backs and arm rests and a plain head lining, a very interesting combination of cloth can be made, using the broad lace on the doors which could be trimmed with the head lining material. By doing this, a better grade of material can be used in the wearing parts of the car with a much less expensive and lighter weight cloth in the rest of the car, as this thinner material is all put on flat and is exposed to very little wear.

There is no part of the interior of a closed car which has to stand the grinding wear of the carpet and it is impossible to manufacture a cheap carpet so that it will not pull



L. M. Erickson, Forest Products Laboratory, discussed "Wood for Automobile Bodies"

H. T. Strong, Wm. Weise Co., read a paper on "Trimming Materials and Style"

out. After a few months, sometimes, it is necessary to spend \$10 for a new carpet, where a dollar or more added to the original purchase price would have bought a good carpet that would give double the wear.

Only 2 per cent of the selling price of a car is expended for upholstery material, yet there is no part of the automobile which adds so much to its selling qualities as the appearance of the interior trimmings. It is suggested that more attention be given to this item instead of cheapening the appearance by continual efforts to decrease cost of interior trim. In this connection it should be appreciated that the final say in the selection of a car is left to the women of the family and that the interior trimming is a focusing point upon which the sale of the car may depend.

## Use of Casein Glue in Body Work Advocated

W. A. HENDERSON'S paper, entitled "Casein Glues for Automobile Body Assembly," outlined briefly the method of manufacture of such glues and the process followed in preparing them for application. Most of the paper dealt, however, with the advantages of casein as compared to animal glues. The advantages claimed include the following:

- 1—Easy to work and to spread.
- 2—Given amount will cover a greater surface.
- 3—When properly mixed, will require no thickening or thinning.
- 4—Is not sensitive to temperature changes or chilling; can be used even at temperatures below freezing.
- 5—Pieces to which glue is applied can be allowed to stand as much as twenty minutes before clamping or screwing together.

- 6—Is water resistant (practically waterproof) and unaffected by any atmospheric conditions met in service.
- 7—Will withstand baking even at temperatures high enough to char wood without weakening the glued joint.
- 8—Strength of joint equal to that of wood.

Casein glue is made largely from casein precipitated from milk, dried and ground. A small amount of hydrated lime is added to produce an insoluble compound. Improvements in the process of manufacture effected since the war are claimed to have overcome disadvantages then encountered.

Preparation of the glue for use is accomplished in a mixing machine. The proportions used are one pound of glue to two of water. After mixing, the glue must stand for 20 min., after which it is ready for use. Glue left at the end of a day is added to the mix on the following day. The glue sets partly by evaporation and partly by chemical action.

The author expresses the opinion that casein glues will displace entirely in the near future the animal glues which now are generally employed in body work.

Replying to questions concerning companies now using casein glue in production, Mr. Henderson stated that this glue now is employed on Star and other Durant bodies, as well as on Dort and on a number of custom built bodies. Among other explanatory statements by the author, the following are of particular interest:

Casein glue will stand baking temperatures as high as 428 deg. Fahr. without permanent injury to the glue joints, but such joints must be allowed to stand for several hours before their maximum strength is recovered completely. Time required in clamps is about the same as with animal glues; at least this has been practice to date. Casein glues have been used in body building work in this country since 1902.

Casein glue penetrates the wood a distance which varies with the porosity of the wood. Its cost is believed to be about on a par or somewhat less than that of good grades of animal glue, but there are claimed to be marked savings in its use, due in part to the fact that no heat and less care is required to prepare the glue and to insure a good joint. The covering qualities of casein glue are also claimed to be superior to those of animal glues.

One member who had conducted some experiments with the particular make of casein glue in question stated that he has found that it does not injure edged tools and is unaffected by moisture and heat, as stated by Mr. Henderson.

## Plating Methods Should Be Controlled Closely

PLATING in the automotive industry today has much the same status as did heat treatment a few years ago before careful methods of control were installed, according to E. M. Baker, assistant professor of chemical engineering, University of Michigan. There are a few notable exceptions to this statement, Mr. Baker said in his discussion of "Rust Resistance of Nickel-Plated Steel," but it holds good in most instances.

Knowledge of the factors governing the quality of plating, he pointed out, is of even greater importance than is a method of rating the quality. For plating on steel, which embraces most of the work done in the automotive industry, there are four sequences of plating nickel and copper which may be used. These are:

- (1) Plating nickel on steel and buffing.
- (2) Plating copper from a cyanide bath on the steel, then plating with nickel and buffing.

- (3) Plating nickel on the steel, plating with copper from either a cyanide bath or an acid copper-sulfate bath, then plating with nickel and buffing. The copper may or may not be buffed.
- (4) Plating as indicated in (2) and (3) and using various combinations or sequences of plating with nickel and copper.

Tests indicate that from the standpoint of resistance to salt spray the less boric acid is used the better; but the more boric acid the nickel-plating solution contains, the easier will be the plating buff; therefore a suitable compromise must be made.

The solution should be free from iron, Mr. Baker stated. "Though I have no specific data to offer," he said, "I am firmly convinced that iron-hydrate sludge, which is almost always formed from iron in solution, is the cause of most of the erratic defects in the nickel plating which are evidenced by the low salt-spray ratings of work plated under conditions which would otherwise give a high quality of plating."

Mr. Baker described in considerable detail methods for testing the quality of plated steel by exposing it to the action of a salt spray and noting the appearance at intervals. He presented a numerical method of rating the appearance and showed that the rust resistance of steel plated with nickel is dependent on the thickness of the plating.

### Current Density Is Important Variable

Discussing the effect of current density on the resistance quality of the plating, Mr. Baker said:

"One of the important variables in plating is the current density used. There seems to be a more or less accepted view among platers that a high current density will result in large crystalline structure. The reverse is true.

"A fine structure may be produced from a solution of low ion-concentration at a low current density or from a solution of high ion-concentration at a high current density.

"The choice of which combination of conditions is to be used to produce a fine grained deposit involves such questions as the reliability of operations, the operation and installation costs, as well as the quality of the deposits. The quantity of metal plated in a given time depends directly on the cathode current density or, to put it somewhat differently, the thickness of the plating is proportional to the product of the current density and the time. For a desired thickness of electrodeposit, the time required for plating varies inversely as the current density. Hence, the output of work per day for plating-tanks varies directly as the current density.

"For plating nickel and copper, it is common practice today to use current densities of from 3 to 10 amp. per sq. ft. of metal to be plated. Current densities of 35 to 100 amp. per sq. ft. are entirely feasible. With such current densities the time required for plating, and therefore the size of the tanks and the floor space occupied in the plant, may be made one-tenth that required by the lower current densities. Such high current densities cut the time of plating in a given tank, for example, from 50 to 5 min. for the same thickness of plating, or to 10 min. for twice that thickness of plating.

"The corresponding reduction in the time of plating enables the use of labor saving conveying equipment, which needs to serve only a few tanks, whereas the installation costs would be prohibitive if 10 times the number of tanks were served. Further, deposits of nickel and copper having a total thickness of 0.001 in. are commercially practicable with the higher rate of electrodeposition.



"These statements have as their basis not only laboratory experiments, but also the fact that plating at the higher rate has been proved feasible in four plants operating successfully for many months. Rigid technical control has been installed and with this and the developing of technical experience came reliability of operation. Quality of plating and reliability of operation were sought; not only were these found, but marked economies of operation also were produced."

Mr. Baker was asked if the Christian Girl process is patented and he replied that he believes it is. Answering a query as to the relative cost of the duplex and the cyanide processes, Mr. Baker said that the former is less complex and that considerable money can be saved in labor costs.

He stated that chromium plating has not yet been reduced to any standard practice, but that fundamentally it has considerable merit. He believes that it may be developed successfully in the future.

## New Types of Wood Used in Body Building Work

IN the paper on "Wood for Automobile Bodies" by Arthur T. Upson and Leyden N. Ericksen, of the Forest Products Laboratory, it is pointed out that a comparative shortage of the most desirable woods for body construction has resulted in extensive substitution of second choice varieties. Data submitted, compiled by the Forest Products Laboratory, show that of the total of 468,000,000 ft. reported by the N. A. C. C. as having been used for body building in 1922, 30.1 per cent was maple, 22.1 per cent elm, 16.4 per cent ash, 11.9 per cent gum, 7.7 per cent oak and 6.6 per cent birch.

The quantity of ash, generally considered the best wood for body building, now used is not less than in past years, but the proportion is much less because of the high price ash commands.

Fifty-one per cent of run boards are made from pine and 17 per cent from sound wormy oak. Trouble from warping often results from the severe conditions as to moisture, etc., to which run boards are subjected, or from an incorrect initial percentage of moisture. About 10 per cent of moisture is considered desirable and conditions are improved by applying a protective coating of water resisting paint.

Oak, ash and elm are the only woods reported used for top bows. Their respective consumption expressed in per cent is as follows: 92, 7 and 1.

Forty per cent of body lumber is first and seconds, 48 No. 1 common and selects and 10.5 per cent Nos. 2 and 3 common. The balance, 1.5 per cent is soft wood.

### Seasoned Ash Is Strong

It is pointed out that, in general, if seasoned ash is of good weight and sound it will have good strength qualities, but the quality of unseasoned ash lumber cannot be judged by weight. Light ash, or brash, is not of good strength as compared to tough ash. The proportion of brash ash has been somewhat reduced by some large purchasers of body lumber by sending inspectors to loading points and instructing them to reject material that seems to be light in handling.

Lack of uniformity in the size of corresponding parts of different makes of bodies has been studied and it has been found that the dimension of a large proportion fall within narrow limits. A program looking toward some measure of standardization now is being formulated.

In discussing the subject of waste in cutting lumber for bodies the following quotations are of interest:

"In many plants considerable care is used in cutting lumber to the best advantage. In the production of high-grade bodies it is sometimes the practice to sort out specially heavy and dense ash for use in certain main body parts, such as top-rails and pillars. In some plants narrow pieces are glued up to widths that can be used in various parts.

"Figures on the waste of material, as estimated by body-builders, vary considerably, ranging from 20 to 50 per cent, with the average somewhere between 30 and 40 per cent. A few operators place their losses as low as 10 per cent, but the majority realize that usually more than one-third the lumber brought into the cutting room is lost in cutting-out defects, trimming ends and in getting out cuttings of specified sizes. The value or cost of the material lost at the saws amounts to an appreciable item when consumption over even a short period is considered. Although a certain amount of waste is unavoidable, careful work at the saws should reduce present figures.

"A considerable saving is made by gluing up stock to get the required sizes, thus avoiding the necessity for cutting some of the large curved parts from thick heavy lumber. Gluing makes possible the use of thinner and lower-priced stock, and it also reduces the losses that occur in band-sawing large cuttings.

"One other important means by which a more complete utilization of raw materials can be brought about is the more general use of ready-cut small-dimension stock. This class of material is cut accurately to rough size at the mill and shipped to consuming plants ready for the final machining. It may be obtained air-dried or kiln-dried. Although frequent changes in models and designs of automobile bodies may cause changes in the sizes of parts and so render the use of ready-cut stock impracticable in some cases, it is nevertheless true that at present a number of automobile companies and body-builders are using considerable quantities of small-dimension stock with good success.

"Some are even buying parts machined and shaped ready for assembling. Large quantities of floor-boards and running-boards are now being bought in ready-cut form, as are also seat frames. Body builders have agreed that if the main parts such as sills, pillars and top-rails could be purchased ready-cut they would like to buy other body parts in the same way, but, as it is now, the smaller parts are cut from material left in cutting-out the larger ones. If, in designing new models, the rough sizes used in the preceding models could be adhered to in some measure, the use of ready-cut stock would be more applicable.

"The advantages of this system are readily appreciated when consideration is given to the saving in freight and the quantity of raw material handled and to the elimination of part of the dry-kiln and cutting-room operations."

In conclusion the paper discusses the suitability of various woods for body purposes and gives a table and other information concerning their physical characteristics.

## Drying Troubles Subject of Round Table Talks

IN a round table discussion participated in by W. R. Jones, the C. R. Wilson Body Co.; R. A. LaBarre, Towson Body Co., and W. R. Palmer, A. S. Nichols Co., it developed that considerable difficulties have been encountered in the artificial drying of wood bodies undergoing painting operations, especially when southern elm and some grades of northern elm and maple are employed. In some cases the savings which the drying ovens were expected to effect have been more than counterbalanced by

the extra cost of the better grades of lumber which it has proved necessary to supply in order to avoid warping, checking and other difficulties encountered in artificial drying during painting operations.

So-called heat-proof cements intended to prevent excessive drying of the wood during baking operations up to 250 deg. Fahr. have been used to some extent but, according to Mr. Jones, are not feasible except on complete assemblies which require no further gluing.

Remarks of Mr. LaBarre in this connection may be summarized as follows: Expensive experiments calculated to prevent checking of door pillars after they have gone through paint drying ovens have been conducted. These include running the rough stuff ovens at about 130 deg. Fahr. on the dry bulb and from 97 to 103 deg. on the wet bulb. A temperature of 100 deg. on a wet bulb was found to be the highest temperature feasible. This corresponds to a relative humidity of about 35 per cent and is used with a dry bulb temperature of 130 deg. at the present time. This is still too low to give desired results.

In the varnish drying oven, 120 deg. on dry bulb and 90 deg. on wet bulb are the maximum temperatures found feasible. It has been found necessary to tighten all wood screws and bolts after drying in the paint ovens.

W. R. Palmer stated that early experiments with forced drying of paint and varnish had resulted in troubles similar to those outlined above, but that this difficulty has been avoided by carefully kiln drying the lumber to a moisture content of 5 per cent and then allowing it to absorb additional moisture until it contained 7 per cent. After this, drying of varnish in an atmosphere with a moisture content sufficient to balance that in the wood results in satisfactory varnish drying without injury to the wood.

## Body Panels Enameled Before Being Assembled

OTTO GRAEBNER, J. C. Widman Co., described the process followed by his organization in enameling body panels before assembly on the frame of the body, and afterward in applying these panels to the body frame without any subsequent painting operation. These methods were described in considerable detail in *AUTOMOTIVE INDUSTRIES* for Oct. 4. Mr. Graebner stated that some 5000 of the bodies already have been built and that the process is a proven success.

The frame employed is substantially the same as in painted bodies, but is held to somewhat closer dimensions. The chief difficulty has been encountered in preparing the metal for enameling. Hood and fender stock is employed. It is necessary, of course, to have the panels free from waves and wrinkles. In case the panels, as they come from the dies, have waves and wrinkles, they are power hammered and finished with emery wheels, first No. 100, second No. 120 grade. Files are not used at all.

After various cleaning operations the panels are dipped in an enamel made by the F. J. Donahue Varnish Co. and are then passed through an oven heated to 450 deg. Fahr. on a conveyor moving at the rate of 8 in. per min. On large panels, three coats are given, and there is a rub with fine pumice after the second coat. If they do not pass inspection after the third coat they are again rubbed with pumice and receive a fourth coat.

Panels which are scratched down to the metal through accident in production are cleaned by boiling about 5 hr. in J. D. Ford's enamel remover or caustic soda, and are then reenameled.

Practically all of the discussion of this paper consisted in queries concerning the various processes followed. The author stated, in response to these questions, that the time required to complete a body is less than one day. All panels are nailed in place. Scratches which do not go through to the metal are sometimes touched up by using an air-drying enamel. All flanges are turned during the stamping operation. Only one, that at the edge of the cowl, is slightly hammered in assembly to the body frame, and it has been found that this operation does not cause it to chip.

George E. Goddard, of Dodge Brothers, asked a number of questions concerning detail methods employed. These brought out the fact that the panels are given considerable crown and that care must be used to avoid hollow spots when applying the panels. The frame must be more accurately made than it is ordinarily, but the greater part of the trouble encountered is in securing a proper surface on the panels. Some difficulty has been experienced with buckling, due to the overheating caused by applying too much pressure to the emery wheels.

## Greater Riding Comfort Sought in New Designs

VARIOUS factors involved in riding comfort were the subject of a lively discussion which followed an informal supper staged by the Research Department of the Society on Tuesday evening. This department is planning to arrange for and follow up research work dealing with various items intended to bring about a better understanding as to what constitutes good riding qualities and how they can be measured accurately.

Dr. H. C. Dickinson, of the Bureau of Standards, who also acts as research manager of the Society, presided and made a brief introductory speech in which the purpose of the gathering was outlined. He was followed by President Crane, who stated that such research work as the society might undertake necessarily would be confined to the underlying principles of riding comfort rather than to development of specific devices intended to improve such qualities.

T. J. Litle, Jr., emphasized the need for learning what constitutes ease of riding, and James E. Hale made the prediction that improved riding qualities will be the subject of many sales campaigns in the near future. He mentioned the fact that differences in spring suspension in combination with tires, especially of the balloon type, give widely different results, so far as riding qualities are concerned.

Walter C. Keys stated that there has been for many years a trend toward better riding qualities and cautioned against hasty conclusions as to what factors actually make for greater comfort. He said that seat cushions have much to do with this matter but that in some cases a pad made from hair only has appeared to be superior to some spring cushions.

S. H. Woods, in discussing rubber shock insulators, indicated that the freedom from noise as compared to metallic spring shackles seems to be an important factor in respect to riding qualities. Other speakers mentioned instances in which freedom from noise and rattles has tended to give at least the impression of better riding qualities.

W. R. Strickland expressed the view that an effort should be made to learn what riding qualities are wanted and what effect spring periods have on riding qualities.

Dr. Gissel, of the University of Michigan, gave a brief outline of the possible physiological effects of vibration.



Several speakers drew attention to the need for determining what character of vibration produces desirable effects so far as the average individual is concerned.

J. W. Watson expressed the view that most of the criticism of riding qualities is due to the comparatively stiff front springs which now are employed. Rear springs, he said, are now quite generally satisfactory. Other speakers drew attention to the difficulty of designing springs which will give riding comfort and still be suitable for all driving conditions, especially in respect to speed. It was stated also that a vehicle designed to absorb shocks within

itself, instead of transmitting them to the passenger, is highly desirable.

There was discussion as to the advantages and disadvantages of inter-leaf spring friction, some expressing the view that such friction is desirable and that for this reason a large number of thin leaves are advantageous. Others took the stand that well lubricated springs provided with means for preventing rapid rebound are better suited to give riding comfort.

It appeared to be the sense of the meeting that the Society should proceed with and encourage research.

## Engine Performance Must Satisfy Car User

*Practical points of carburetor and manifold design brought out by comments made on papers at fuel and engine session.*

*C. S. Kegereis, A. M. Dean, J. W. Swan, and C. A. Kirkham speak.*

By J. Edward Schipper

**P**RESENT day carburetors and manifolds still are capable of much improvement although many advances in their design have been brought about in the last few years. This, in brief, is the general conclusion reached in the papers presented at the fuel and engine session and in the discussion which followed.

C. S. Kegereis reported the results of research work calculated to furnish data, on the basis of which it would be possible to compare the performance of some 23 commercial carburetors tested at Perdue University with the hypothetical performance of an ideal carburetor. He reached the conclusion that there is considerable room for improvement in practically all important features.

Messrs. Dean, Swan and Kirkham devoted the bulk of their paper to a description of the Swan manifold and to a discussion of the need for securing better distribution than is now commonly obtained.

Discussion of manifold design brought out some difference of opinion as to whether the use of a butterfly valve for controlling the quantity of exhaust used in heating the inlet manifold is desirable or otherwise.

### Trend Toward Smaller Manifold Diameters

**I**N a paper on "Fundamental Improvements in Manifold Design" by A. M. Dean, J. W. Swan and C. A. Kirkham it was stated that there has been a notable tendency during the past year to reduce intake manifold diameters to obtain more satisfactory low speed performance, and that this had to be done with a full knowledge of the sacrifice of top end performance of the engine. The inlet manifold, it was stated, should not only furnish the same total quantity of fuel mixture to all cylinders but also the same total quantity of fuel and the same proportion of light and heavy constituents. If this condition is realized the following advantages are gained:

- (1) Increased torque, particularly at low engine-speeds, due to uniform power development.
- (2) Increased acceleration due to uniformly rapid burning mixture in each cylinder.
- (3) Economy; since the carburetor may be set at the point of best economy without the necessity for favoring certain cylinders.
- (4) Ease of starting; since the tendency to "load" in certain cylinders is avoided.

Equal distribution also yields some secondary results, as follows:

- (1) Supplying a uniform mixture to each cylinder.
- (2) Lessened vibration.
- (3) Lessened carbonization.
- (4) Fixed ignition.

The best method of checking the distribution consists in taking exhaust samples from all of the cylinders simultaneously and analyzing these samples. One per cent of carbon monoxide in the exhaust represents about 4 per cent of fuel waste. The authors made the claim that heat is not necessary to accomplish equal distribution.

The greater part of the paper was given over to a description of the Swan manifold, which was described and illustrated in *Automotive Industries* of Nov. 8, 1923, and to a discussion of its features. Tables were given of analyses of exhaust gas samples taken from each of the six cylinders of an engine when fitted with an ordinary and with the Swan manifold, together with a table of depressions at the center and at the ends of the Swan manifold for different engine speeds.

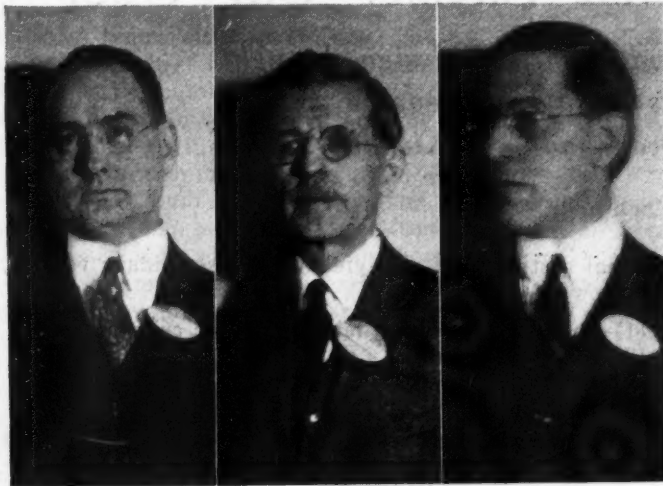
Ray Harroun asked if it were not necessary to have some control of the heat in order to prevent heating of the fuel in the carburetor. A. M. Dean answered this by stating that he found no detrimental effects from the pre-heating of the fuel due to the jacketing of the mixture. By keeping the jacket high enough and not permitting it to become excessively hot, the carburetor is not affected. He also stated that to a large degree the temperature control is automatic. At low speeds the transfer of heat to the mixture is greater because of its lower velocity, while at high speeds the transfer of heat is less due to the high velocity, which approximates the condition desired.

F. E. Moskovics cited an interesting example of manifolding discovered in racing cars with eight-in-line engines. He stated that, after employing several types of manifold, the cars which were most successful and developed the highest r.p.m. used straight, single manifolds for each cylinder with eight carburetors in the case of two cars and four carburetors in the case of another. He found that the cars using eight carburetors turned over 175 r.p.m. faster than those using four.

D. F. Mallony asked if Mr. Dean did not believe in the use of a hot air stove. To this Mr. Dean replied that it depends altogether on the carburetor employed. Mr. Mal-

lony cited the fact that when a mixture proportion is settled for summer time, it is necessary to change the mixture proportion for winter, unless artificial heat of some kind is employed. He found one job which could run on a summer setting with heat applied to the riser portion from the carburetor to the intake manifold. He stated that if this heat were not applied it was necessary to open the fuel nozzle to give a larger proportion of fuel. He added that, in winter, manifolds have an excess of wet fuel which can be used, but is hard to control. He expressed the belief that puddles of fuel which gather in the intake manifold can be used successfully in acceleration.

A. M. Dean, in commenting on these remarks, stated that, while one often seems to get good acceleration in



Authors of paper on manifold design, C. A. Kirkham, J. W. Swan, A. M. Dean

driving, a check with a stop watch often indicates that acceleration is not as rapid as it is thought to be. In the Swan type of manifold, he said, only a little moisture collects on the wall and there is no back drainage.

W. G. Higginbotham, commenting on Mr. Dean's statement that the point of greatest refrigeration is at the mixing chamber, asked if it were not at the throttle. To this Mr. Dean replied that the point of greatest refrigeration is at the throttle, but that it is necessary to apply the heat above because to apply the heat directly at the throttle would bring it too close to the jet and, consequently, affect the fuel flow through the jet. In answer to a question by Mr. Higginbotham as to the real objection to not having controlled heat, Mr. Dean replied that controlled heat is found to be bad on the long climb where the manifold will begin to cool. He stated that it also adds cost and complications and, furthermore, that any butterfly valve which is free enough to work, will leak, or if tight enough not to leak it will fail to work. Consequently this makes a bad method of controlling heat. Mr. Higginbotham stated that he differed in this, believing that controlled heat is ideal because with a cold engine it is possible to throw all of the heat of the exhaust into the mixing chamber and thereby greatly shorten the warming up period.

Cecil Taylor asked whether roughness or smoothness affects the functioning of the manifold. To this Mr. Dean replied that the smoother the manifold the better. He said that he had used some experimental manifolds made out of sheet metal and welded and that these remained dry.

#### Greater Power Claimed

One member asked whether the velocity of flow in the Swan intake manifold is increased or decreased as compared to other designs. To this Mr. Dean replied that no claims for greater power are made for the Swan manifold.

In reply to another question Mr. Dean said that change in the firing order does not affect distribution.

C. S. Pelton, president of the Swan Manifold Co., stated that he had a six cylinder engine equipped with a Swan manifold and has found that after climbing a long hill and allowing the engine to become heated to a good running temperature switching over to lean mixture will result in all of the cylinders cutting out just as if the ignition had been shut off.

Mr. Berry stated that if an engine will cut out simultaneously on all cylinders it is evidence of good distribution. He said that the best manifolds require the least gasoline for acceleration and added that, in developing manifold design, it is very useful to have a single cylinder engine and a multi-cylinder engine of the same cylinder size side by side. If the manifold designer can get, with the same carburetor setting, the same characteristic performance in the multi-cylinder engine that he gets in the single cylinder engine under best conditions, he is on the right track. He named three characteristics of a good intake manifold, as follows: 1. Smallest wet surface; 2. Minimum included volume; 3. Minimum delay of flow from the carburetor to the manifold. Mr. Berry asserted he had been successful in reducing the fuel consumption of one four-cylinder engine with a Swan manifold to 0.57 lb. per b. hp. hr.

#### Round Manifold Favored

Otto M. Burkhardt, consulting engineer of the Pierce-Arrow Motor Car Co., spoke in favor of the round manifold. He stated that he had tried sections other than round and that he could pour gasoline out of the other shapes, but found no such trouble with a round section. He added that when acceleration is desired, it is desirable to have quick distribution. Consequently it is better not to have puddles of fuel in the intake manifold. He asked Mr. Dean what are the objections to the four-port, six-cylinder engine as compared to the three-port. Mr. Dean replied that he always has found better results with the three-port engine. Also that he has found that a throttle valve with the butterfly shaft parallel to the crankshaft is more satisfactory than one at right angles because the mixture is not then deflected to one end or the other of the manifold.

Charles Crawford, chief engineer of the Stutz Motor Car Co., stated that he had spent some \$9,000 in various manifold patterns, trying triangular, circular and rectangular sections, and had found that the rectangular section is best. He stated that on the particular engine in question he would have used the Swan manifold had it not then been necessary to locate the carburetor over the generator. Consequently he used a more conventional type of manifold, but one having some of the Swan characteristics.

## Commercial and Ideal Carbureters Compared

C. S. KEGEREIS, research associate in the carburetion section, Purdue University Engineering Experimental Station, gave a paper entitled "Comparison of Ideal and Commercial Carburetor Characteristics." It contained data calculated from carburetor tests made at Purdue and from engine and car tests made at other places. A total of 23 carbureters were tested at Purdue and a summary of the results is included in the paper. The points on which the tests bore include the effects of pulsations, metering characteristics, loss of pressure in the carburetor, and the effect of air temperature on metering.



In the calculations, cars are grouped into four classes, according to weight and maximum speed, and for each class an ideal mileage on one gallon of fuel is calculated for various speeds. Comparisons then are made with the actual mileage which would be obtained at the same speeds if the cars were fitted with carbureters of which the test results were available. The author reaches the conclusion that present commercial carbureters might be improved by so designing them that they would give the proper mixture proportion throughout the flow-rate range or that they would operate to greater advantage for three conditions, namely, level road operation, hill-climbing at full load and idling; by the use of a fully developed accelerating well providing high-power mixture instantaneously for a short period; by reducing the drop in pressure across the carburetor so as to increase the maximum available engine power; by increasing the atomization as far as consistent with the foregoing requirements, and by providing proper vaporization and distribution.

O. C. Berry, chief engineer of the Wheeler-Schebler Carburetor Co., stated that, regardless of theoretical considerations, the carburetor engineer has to please the automobile engineer and he in turn has to please the automobile driver. What the carburetor engineer must produce in order to meet this condition is a carburetor which assists in giving good hill climbing and rapid acceleration.

Mr. Berry stated that it must be conceded that the modern carburetor is a good metering instrument. Another point he made is that when the carburetor is bolted on different engines, there is often a material change in the characteristics of the carburetor. Some times as much as 15 per cent more fuel than should be needed must be supplied by the carburetor in order to secure the desired results. If any engineer is in doubt about this question Mr. Berry suggested that he put a glass manifold on his engine and watch the swirl of the fuel mixture which favors different cylinders at different speeds. He stated that the distribution is often just as bad with wide open throttle as it is at closed throttle and added that a carburetor can meter and pulverize, but cannot be expected to put heat into the fuel to vaporize it, nor can it distribute the fuel equally to the cylinders.

#### Tice Reviews Experimental Work

P. S. Tice, carburetor engineer for Stewart-Warner, stated that in his experimental work he had been endeavoring to find an orifice with a discharge coefficient which does not vary with temperature change in the fuel. Normally, it is the tendency of the coefficient to vary through a wide range. This change in fuel discharge with changes in temperature tends to make a fixed adjustment type of instrument less satisfactory, he stated. He said, however, that he had been able to reduce the variation of the coefficient with temperature down to 2 per cent.

One member commented on the fact that after correct metering characteristics of the carburetor are obtained it is necessary to vaporize the charge before it is distributed. Hot-spotting does not fully accomplish the work, he said, and exhaust heat is not satisfactory.

Commenting on the remarks of Mr. Kegereis, regarding pulsation, P. S. Tice stated that this is due no doubt to changes of relative velocity in the back flow to the carburetor from the cylinders. He stated that this is noticeable particularly in four-cylinder engines. Experiments on a three-cylinder engine, that is, on three cylinders of a twelve-cylinder Liberty engine have shown that the pulsating is still greater.

C. F. Scott, manager of apparatus sales of the General Electric Co., asked the author if he believed in needle

valve adjustment from the dash. Mr. Kegereis replied that he is not in favor of needle valve dash adjustment because of the inability to secure uniform and certain results. He said that the needle valve is apt not to be concentric with the orifice and there are other practical difficulties in the way. He said that on a three month test with Government trucks it was proved that a fixed needle valve adjustment results in better economy than one which is variable from the dash. He modified this statement, however, by stating that it is necessary to have a starting adjustment which will take care also of normal operations. He advocates thermostatic control.

#### Influence of Spark Advance

C. W. McKinley, sales engineer Tillotson Mfg. Co., pointed out the difference in performance which the spark advance may make. He stated that drivers very often secure remarkably different results with different spark advances and then blame the lack of economy on the carburetor. One test which he mentioned specifically showed that with a 5 deg. spark advance 1.5 of fuel per b. hp. hr. were required, where with a 55 deg. advance this consumption was reduced to 1.1 lb. fuel per b. hp. hr. Another factor which is responsible for material variations in economy is the water temperature. He mentioned that with 35 deg. spark advance and a water temperature of 210 deg. Fahr., an economy of .85 lb. of fuel per b. hp. hr. was secured.

F. E. Moskovics called attention to some interesting variations which occurred as a result of changes in thermal conditions under the hood. He mentioned one test in which the engine gave trouble at times, due to the variations of temperature. On a certain trip through Ohio, where the temperature under the hood was 140 deg. Fahr., good en-



Chas. S. Crawford,  
chief engineer, Stutz  
Motor Car Co., dis-  
cussed manifold de-  
sign

C. S. Kegereis, Pur-  
due University, read  
a paper on carbur-  
eter design

gine performance was secured but on climbing Union Town hill where the temperature was 210 deg. or more, the performance was very poor. By changing the conditions so that the temperature under the hood was 130 deg. Fahr. on the same hill, excellent performance was secured.

O. C. Berry inquired if the mixture did not become lean, due to the fact that the gasoline tended to boil under these extreme temperature conditions. Mr. McKinley also stated that he believes that much trouble is attributable to boiling fuel and mentioned that he had driven a car until it became quite warm under the hood, and upon stopping the car quickly and examining the gasoline in the float chamber had noticed the bubbles indicating boiling rising.

Messrs. Moskovics and Berry agreed that the addition of anti-knock compound to the fuel seems to prevent trouble due to overheated intake air.

## Record Attendance at Aeronautic Session

*A. H. G. Fokker says lack of landing fields is chief hindrance to aviation growth in this country. Ralph Upson tells why he thinks Shenandoah should use hydrogen gas in flight to Pole.*

INTEREST in the aeronautic session was greatly enhanced by the presence of Anthony H. G. Fokker, the noted Dutch aviation exponent, who spoke briefly on the development of commercial aviation abroad and emphasized the tremendous possibilities of air transportation in this country. More than 250 members of the society were in attendance and interest along commercial lines was stimulated by the fact that W. B. Stout, who occupies a prominent place in the field of commercial aviation, acted as chairman.

After showing that what constitutes long distance operation in Europe would be normal mileage in this country, Mr. Fokker stated that the greatest hindrance to commercial aviation in this country is lack of landing fields with their attendant facilities. Due to wartime activities practically every large city in Europe entered the post-war period with an aviation field which fulfilled the standards of the time. Although Amsterdam had no field, far-sighted business men backed what is now one of the foremost aviation and related industrial centers. In America, comparatively few fields have been established, and these are not coordinated with the lanes of commercial activity. Until this condition is remedied, air transportation here can not take the place to which it is rightfully entitled.

Mr. Fokker paid high tribute to the American air mail service, stating that the standards for maintenance of schedules and safe flying set up by this department are not receiving the measure of appreciation in this country that is given them abroad. He criticized the attitude of the American press in encouraging the idea that aviation is highly dangerous, stating that scare-heads denote every fall, while the achievement of two or three million miles of flying without a fall or forced landing goes almost without notice.

Airplanes, he said, will never carry heavy bulk freight,

but have already proved their merit in the transportation of light, perishable goods, mail and express. At present many lines are hampered by the excessive overhead which follows the maintenance of terminals for the operation of but one or two planes. If the expense of the terminals were pro-rated over the operation of a large fleet, rates could be reduced to a figure which is competitive considering the premium which must be placed on delivery in approximately one-third of the time required by the fastest trains. In substantiation of this point he cited that business utilizes the telephone and telegraph in preference to the slower, cheaper mail system of the present day. Likewise, automobiles have supplanted the slower horse, and steamships the older sailing vessel.

### Fokker Analyzes Aviation Field

Mr. Fokker predicted that the commercial aviation field will divide itself into three general classes:

1. The slow, low-powered plane for individual use or aerial taxi service. The minimum engine power of this type will be about 50 hp., as engines of lesser power leave no reserve for unusual conditions and necessitate considerable distance for the take-off of the plane.
2. Planes equipped with engines of about 500 hp. for intercity passenger and freight service.
3. Planes driven by engine power ranging from 1000 hp. upward to possibly 20,000 hp. for trans-continental or trans-oceanic voyages.

In reply to various questions during the discussion, he stated that freight rates as low as 15 cents per ton-mile already are in operation where the overhead is low. At present the planes in operation on the European lines fly only a few hundred feet above ground. This height, however, must be regulated to the characteristics of the route. In commercial operation, engines already are showing a life of 1500-2000 hr. between major overhauls. Planes of Fokker construction have shown an operating life of 3000 hr., but are obsoleted due to improvements in design. He confidently expects that 5000 hr. will be the minimum life of the commercial plane structure.

In a brief talk of timely interest, Ralph Upson, former chief engineer of the aeronautic department of the Good-year Tire & Rubber Co., said that hydrogen would be preferable to helium for use in the dirigible Shenandoah for its Polar flight. He stated that the chief reason for inflation with helium rather than hydrogen is the elimination of the fire hazard, which he regards as overestimated when the superior advantages of hydrogen are considered. As related to the proposed cruise to the North Pole, he maintains that the use of hydrogen instead of helium would practically double the cruising radius and improve the general safety of the crew to the same extent.

He grants that hydrogen is inflammable, but emphasized the fact that it is not explosive. Even when inflated with helium, a balloon of this type is not fire-proof, as the fabric jacket may be ignited by some ex-



Three men who took a prominent part in the aeronautic session—left to right, W. B. Stout, Stout Engineering Laboratories; A. H. G. Fokker, prominent Dutch aeronautic engineer, and J. G. Vincent, Packard Motor Car Co.



terior means. The rate of combustion is no doubt lower when inflated with helium, and some safety factor results, but for a long cruise in practically unknown territory this factor is more than offset by other safety considerations.

When used as the displacement element in a dirigible, hydrogen has about 40 per cent more lifting ability than is obtained with helium. As the hydrogen is cheap, it may be allowed to escape when it is desired to reduce the buoyancy, while helium is expensive and must be withdrawn into a storage system that entails an increase in weight. This feature adds another 20 per cent to the



*Simplified form of decelerometer developed by the Bureau of Standards for use by police authorities in checking effectiveness of brakes*

general ability of the hydrogen-filled bag. Another 40 per cent is credited to the fact that a greater supply of fuel can be carried, due to the superior buoyancy of the hydrogen-filled bag, and also that in case of extreme emergency the hydrogen which might otherwise be allowed to escape may be used as engine fuel. In this manner, Mr. Upson demonstrated that the sum of these three factors would practically double the cruising ability of the Shenandoah. Therefore, he advocates use of hydrogen for the polar cruise.

#### All-Metal Dirigible Bag Advocated

Mr. Upson stated that all dirigibles of the type of the Shenandoah leave something to be desired in the way of bag characteristics. The fabric construction is neither fireproof nor weatherproof and must be renewed at least once each year. As the remedy for these defects he advanced the possibilities of all-metal bag construction, stating that development work along this line was already under way. It is planned to use the lighter alloys throughout the entire construction, as their value has already been demonstrated in previous aeronautic construction. The study of the form of the buoyant member has resulted in new conceptions of its form, it having been determined that a reduction of the length to diameter ratio has produced better streamline construction and reduced resistance.

From the angle of the materials of construction, "Notes on Sand-Cast Aluminum-Copper-Nickel-Magnesium Alloy," a joint paper, was presented by A. J. Lyon and Samuel Daniels. These notes were developed from observations of the characteristics of light alloy pistons and air-cooled cylinders at the army engineering department. Observations have been made from test bars and the engine parts. The chemical contents of the alloy are: Aluminum, 92½ per cent; nickel, 2 per cent; copper, 4 per cent; magnesium, 1½ per cent.

In casting, the best results are obtained by using choked gates and pouring the metal slowly. Unless chills are used freely at the thicker sections, a tendency

toward pinholes and porosity is shown. The alloy is simple of composition and may be remelted; in fact, remelting seems to improve its characteristics. This alloy retains its characteristics to a marked degree at high temperatures after having been properly heat-treated. As cast, its tensile strength is 25,000-28,000 lb. per sq. in., the elongation in 2 in. is less than 1 per cent, and the Brinell hardness is 70-80.

In heat-treating the time of soaking and aging is as important as the temperatures at which these operations are performed. Exhaustive tests have shown that the best results are obtained by the following procedure:

Quench in boiling water.

Age 16 hrs. in water at 212 deg. Fahr.

This treatment produces the following physical properties:

Tensile strength, 35,000-40,000 lb. per sq. in.

Elongation in 2 in., less than 1½ per cent.

Brinell hardness, 80-100.

Tensile tests made after the metal has been subjected to a temperature of 600 deg. Fahr. indicate an increase in strength. The metal is highly stable, due to the long soaking period, and its machining properties are excellent. The reduction in strength or fatigue due to prolonged operation is somewhat less than that of other aluminum alloys.

A review of engine design practice, with the resulting deductions for future guidance, was made by G. J. Mead in his paper, "Designing for Reliability." He emphasized the need for designs which involve the use of existing materials, as engine cost and performance must not be based on the experimental model, but upon those made in the regular production routine. He stated that aviation engine makers have encountered some resistance due to the fact that magneto and spark plug makers have let down their standards of equipment and are building for the car rather than the aviation engine. In summing up the lessons learned which are of most value to the aviation engine designer and of equal value in the car engine field, he mentioned among others:

1. Need for more rigid crankcase structures, along with larger crankshafts.
2. Better valves and valve seat material, with particular mention of the advantages of the tulip valve.
3. The greater use of aluminum alloys for crankcases and similar structures, to produce greater rigidity with less weight.
4. More reliable lubrication systems.



*Two speakers at the aeronautic session—R. H. Upson, Aircraft Development Corp. (left) and C. M. Manly, of Manly & Veal*

# Researches Develop Better Fuel Utilization

*Greater dilution with heavy fuels is shown by winter tests. Government investigators learn mixtures resulting in best acceleration. Demonstrations illustrate Midgley's paper.*

**R**ESearch reports tending to show that the less volatile fuels give greatest crankcase oil dilution in winter as well as in summer, but that otherwise there is comparatively little to choose between most of the grades tested when their relative production from a given quantity of crude is considered probably were the most important factors in the research session.

There was, however, a great amount of interest in the demonstration by Messrs. Midgley and McCarty and the informal talk by Mr. Midgley which preceded it. These two items on the program were calculated to show the effect of detonation and other factors on the heat radiated to the cylinder walls of an engine.

It appeared from Roger Birdsell's paper that, within the rather wide limits of the fuels tested, there is not much to choose, so far as Ford engine performance is concerned, at least, in respect to the effect which these fuels have on acceleration.

It is significant, however, that many users prefer a fuel with a larger proportion of light ends than is commonly marketed, and are willing to pay a higher price for such a fuel, especially in winter months. This fact was brought out in the Warner report.

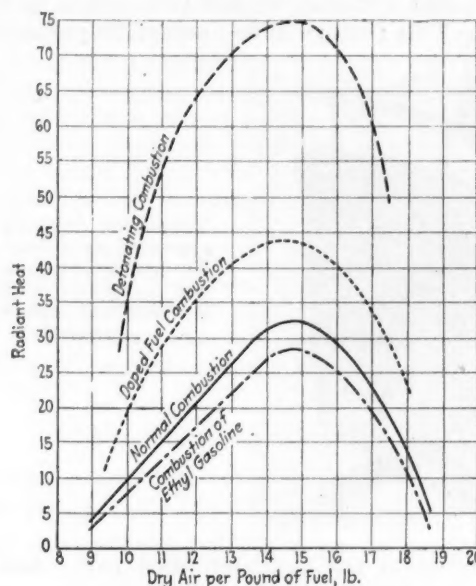
## Flow of Radiant Energy Measured by New Device

**T**HOMAS MIDGLEY, JR., and H. H. McCarty, of the General Motors Chemical Co. and the General Motors Research Corp., respectively, in a paper discussed the radiation characteristics of the internal combustion engine. Reference was made to the investigations of Helmholtz on the laws of radiation, which were made some thirty years ago, as well as to the observation of Professor Callender in 1907, that a non-luminous flame may cause heat loss during and after combustion.

When the mixture in a gas engine burns, heat is lost in two ways, by conduction and by radiation. Loss by conduction is due to the contact between the hot gases and the combustion chamber wall. On the other hand, radiant heat is the same in character as light, being converted into sensible heat only when it strikes the cylinder walls.

For the purpose of making a study of the variation of loss by radiation, the authors fitted a quartz window into the wall of the combustion chamber of a Delco-Light  $\frac{3}{4}$  kw. engine, using quartz for the window because it passes the infra red rays, which will not pass through glass.

If the flame were merely observed through the window the impression received would be due to the predominant color of the flame during the cycle. A stroboscopic device was therefore rigged up in front of the window, which would expose the latter only for an instant during each cycle through a  $\frac{1}{32}$ -in. slot. This device was driven from the crankshaft in such a manner as to make it possible to change the phase relation of the stroboscopic disk to the crankshaft. In front of the



Change in heat radiation with mixture proportion for different forms of combustion

window and exposed to radiations passing through it by the stroboscope was a thermo-pile, obtained from the Bureau of Standards and constructed of copper and constantin metal. In order that it might not be affected by the heat of conduction, the element was mounted in an evacuated tube. The effects of the radiant heat on the thermo-pile were recorded on a sensitive galvanometer.

The purpose of the investigation was to determine the variations in radiation from the flame in an internal combustion engine, due to changes in mixture ratio and to detonation, and the distribution of this radiant energy. No attempt was made to obtain quantitative readings.

### Relation of Radiation to Mixture Studied

By eliminating the stroboscope from the set-up, the relation of radiation to mixture ratio was studied. The carburetor was adjusted to give various mixture ratios, and the changes in the amount of radiation were observed and recorded as galvanometer deflections. It was found that the maximum indications were obtained with approximately the theoretically correct mixture ratio. Four fuels were investigated, viz., kerosene that detonated decidedly; kerosene plus 3 cc. of tetra ethyl lead per gallon (doped fuel combustion); a high test gasoline free from detonation (normal combustion), and new Navy gasoline plus 3 cc. of tetra ethyl lead (ethyl gasoline).

The amount of radiant energy given off decreases as the mixture is either leaned or enriched, but if the mixture is made extremely rich the radiation increases again and may even become greater than with the theoretically correct mixture proportion. This is probably due to the liberation of free carbon under these conditions. It was also found that the radiation in general is proportional



to the pressure as shown by pressure-time indicator cards.

The belief is expressed that the amount of radiation shown under conditions of detonation is not correct, for the reason that the moment of detonation ordinarily advances and recedes through an angle of 20 deg., and as the stroboscope exposes the thermo element to the effects of the flame for a much shorter period of each cycle, but during a considerable number of successive cycles, the detonation will occur sometimes before and sometimes after the element is exposed.

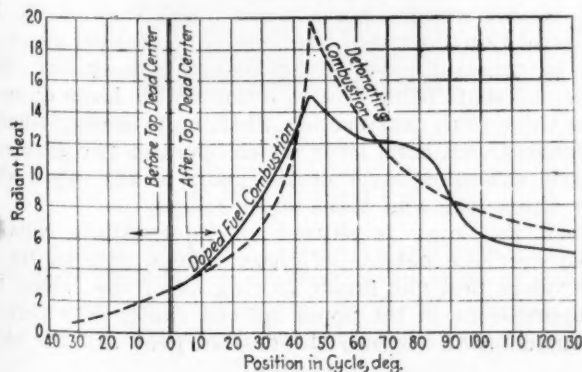
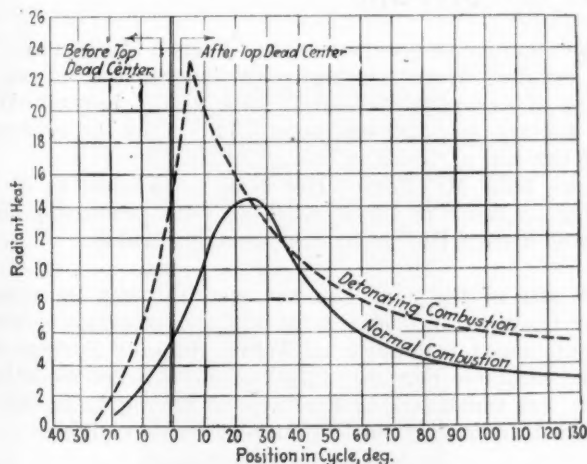
One conclusion drawn by the authors from their results is that the radiation is much more a function of the chemical reaction involved than of the temperature of the gases.

### Apparatus Exhibited

Mr. Midgley had on the stage some of the same apparatus used in the tests the results of which were reported in the paper. In his informal talk Mr. Midgley said he had learned that the loss of energy radiated to the cylinder walls during the fraction of a second that the piston is near top center is sometimes five times as great when detonation occurs as it is when the combustion is normal without detonation.

By the use of a stroboscope it has been found that the extra loss of radiant energy which takes place at the time of detonation is liberated in approximately 1/5000th part of a second.

Mr. Midgley showed curves plotted between radiant energy intensity and degrees of motion of the flywheel. With ordinary fuel and normal combustion this curve has a rounded peak at about top dead center, but when detonation occurs this peak becomes very sharp and many times



(Above) Variation of heat radiation during cycle, with normal and detonating combustion

(Below) Variation of heat radiation during cycle with doped fuel and detonating combustion



Thos. Midgley, Jr., General Motors Research Corp., who presented the paper on radiation characteristics

Roger Birdsell, U. S. Bureau of Standards, who read a paper on "Economic Fuel Volatility"

H. H. McCarty, General Motors Research Corp., joint author with Thos. Midgley, Jr.

higher than the maximum with normal combustion. A curve plotted between radiant energy intensity and quality of mixture has its peak at the mixture of maximum power, a minimum value with leanest mixture, and another low value with the mixture 60 per cent rich. When the mixture richness is increased beyond 60 per cent, the radiant energy liberated increases with great rapidity. This is attributed to the liberation of large quantities of free carbon.

In reply to a question concerning the effect of spark advance upon the release of radiant energy, Mr. Midgley stated that the radiation increases as the spark is advanced up to a certain point and thereafter decreases as the spark is over-advanced. He said also that radiation increases slightly with increase in compression.

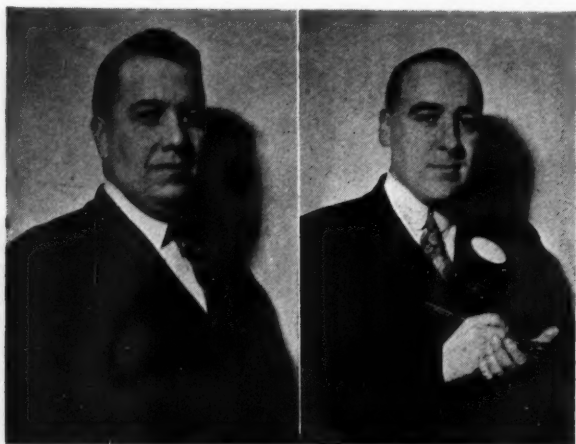
## Volatile Fuels Yield Superior Performance

JOHN A. C. WARNER, assistant research manager of the S. A. E., made a report upon winter road tests of fuels which were conducted by various automotive concerns in cooperation with the joint committee of the S. A. E., N. A. C. C., A. P. I. and Bureau of Standards. Some of the results of these tests were reported upon at the 1923 summer meeting of the society, but at that time the analyses of crankcase oil samples had not been completed. These have since become available.

A summary of the results of the winter tests shows that:

1—There is a slight increase in average fuel consumption for the increase of 55 deg. Fahr. in the 90 per cent point of the distillation curves. This difference in economy is unimportant when compared with the estimated difference in possible production of the two extreme fuels from a given quantity of crude.

2—Drivers agree that the more volatile fuels are superior as regards starting and general performance, in spite of the fact that they purposely were kept in ignorance as to which of the fuels actually were more volatile. The preference corresponded to the relative volatility arrangement between the 14 and 20 per cent points of the distillation curves. Particular interest is attached to this because of the relatively small temperature difference existing within this range.



J. A. C. Warner,  
assistant research  
manager, S. A. E.

R. E. Wilson pre-  
sided at the research  
session

3—Use of the less volatile fuels results in greater dilution of crankcase oil and that similar fuels give greater dilution in winter than in summer.

4—Actual average crankcase oil consumption for all of the large number of cars used in the test was at the rate of 1 gal. for each 476 miles.

Some supplementary tests using a certain commercial gasoline in comparison with a special "winter" gasoline of a more volatile grade marketed in the same locality indicated that there was a marked preference for the more volatile variety.

Discussing Mr. Warner's paper, Chairman R. E. Wilson pointed out that tests have shown that the dilution of crankcase oil reaches a maximum after about 100 miles of service, but that effects of dilution are not serious until after 500 miles. This seems to indicate that dirt in the lubricant rather than dilution by fuel is the cause of rapid wear.

One member made the suggestion that because of the lower temperature of the oil in winter and its consequent greater viscosity, the greater dilution which occurs in winter may still be less serious than that which takes place in summer when the oil is warmer and less viscous. In this connection, C. W. McKinley stated that oil pressure is usually higher in city driving than in long runs across country, because in city driving the oil usually does not attain a very high temperature. In cross country running, the oil pressure often drops to one-quarter or even one-eighth of that usual in city running.

The Birdsall paper gave an outline of tests conducted at the Bureau of Standards in an effort to determine the effect of fuels of differing volatility upon acceleration. The fuels used were known as A, B, C and D and are the same as those employed in earlier tests and similarly designated, fuel A having the lowest distillation curve and fuel D the highest.

Better accelerations were obtained with fuel D than with fuel B under some conditions and the maximum acceleration was obtained with a mixture such as to give maximum power at 600 r.p.m. With this setting the acceleration was more rapid than it was with a richer mixture.

## Here and There About the Meeting

A NEW policy of charging \$2 to non-members for the privilege of attending the sessions was inaugurated at the Detroit meeting. Two formidable looking guards barred the door to the meeting rooms and stopped all those who could not produce an admission badge. On more than one occasion prominent members of the society were seen feeling through their pockets with that "I-wonder-where-it-is" expression on their faces while the guards stolidly and skeptically looked on. They recognized only badges, not faces.

RALPH UPSON and Hans Fooker had a friendly tiff which amused the crowd at the aeronautic session. Talking of the relative ability of the dirigible and the airplane, Fokker said that the service given by the former frequently depended on perfect weather conditions and that passenger-mile records had to be considered with that fact in mind. Upson replied that, of course, the best records were made under predetermined favorable conditions—as, for instance, the Fokker coast-to-coast flight.

AFTER the brake session a number of persons about the lobby were asking when and where Henri Perrot began his four-wheel brake studies. The following biographical sketch of the French engineer is of interest:

Educated at the Ecole des Arts et Metiers, Paris. Entered the shops of the Brasier Co. and in 1906 became chief engineer of that organization, in which position he stayed until 1909. In 1909 he became chief engineer of the Argyll Co. in Scotland. There he began development first of front wheel brakes and, in 1911, of four-wheel brakes. This work he continued throughout his connection with the Argyll Co.

In 1914 Mr. Perrot was recalled to the French army and served for some months as a corporal and for part

of the time as an observer in the French air service. He was recalled from service with troops and placed in charge of aeronautical engine work at the Lorraine-Dietrich factory as chief engineer. This work he continued until the end of the war.

Since 1918 Mr. Perrot has been established as a consulting engineer in Paris, working with practically all of the well-known European designers on brakes.

THE site of the next summer meeting was the subject of frequent informal debates. The meetings committee announced formally that White Sulphur Springs will not be available because of lack of hotel accommodations. There was much talk of a return to Spring Lake, but no definite information on the subject was available.

AN exhibit which drew attention was that of the McCarrall Constantmesh Transmission. Helical gears are used in constant mesh throughout this gear box, those on the tail shaft being free to rotate on the large diameter of the three-pline construction. Shifting is accomplished by the conventional hand lever which operates two gate rods. Integral extension cages on the gears of the upper shaft carry three long and three short rollers.

When the lever is shifted an intermediate collar is moved over the outside of these rollers, picking up the long rollers first and finally forcing all of the rollers into the depressions in the upper splined shaft, thus forming the engagement between the desired gear and the shaft.

A SMALL but interesting machine tool exhibit was held in connection with the meeting. Three companies, the Heald Machine Co., Norton Co. and American Grinder Co., showed lines of tools in the basement of the General Motors Building just off the big assembly hall.



# Trucks and Buses Solve Transport Problems

*Methods of coordinating various types of carrier still to be determined but principles already are outlined. Congestion of terminals relieved by motor haulage. Progress in design.*

**N**EEED for better coordination of transport facilities and the tremendous benefits to be derived from co-operation between trucks and railroads and buses and electric lines were emphasized at the transportation sessions. One big question, however, appears in the minds of practically all students of transportation: "How can coordination be accomplished?" Opinions differ as to the best answer to this important question but those most familiar with the facts are far from being dogmatic in their conclusions.

F. C. Horner, who presided at the truck transportation meeting, summed up the general view when he pointed out that the picture could not be painted in solid white or solid black. Consideration of any specific means of coordination must involve careful thought and a shading of opinion.

Principles have been agreed upon, however, and definite progress has been made in the last year toward proper combination of the various forms of transportation. The report recently adopted by the National Transportation Conference on coordination of motor transport with other transportation agencies was taken as a basis for the speeches and discussion at this gathering of engineers. The truck meeting closed without anyone having voiced disagreement with any of the principles laid down in that report.



J. A. Emery, Ford, Bacon & Davis Co., predicted a bright future for the motor bus

The relation between buses and electric lines was the chief topic discussed at the motor bus session, although considerable interest developed in R. W. Meade's paper outlining the history of bus design and suggesting desirable future developments. J. A. Emery, Ford, Bacon & Davis Co., defined the various fields in which motor buses can operate profitably and expressed the view that motor vehicles will supplant electric cars in many cases when the time comes for replacing present track equipment. Mr. Meade predicted the use of steam generated

by low-grade fuels as the motive power of the future bus.

Robert C. Wright, of the Pennsylvania Railroad, and R. D. Sangster, industrial commissioner, St. Louis Chamber of Commerce, were the speakers at the truck session, one representing the point of view of the carrier, the other of the shipper.

Mr. Wright stated that the motor truck undoubtedly has a big field of usefulness in hauling l. c. l. freight, but declared that it can not be depended upon to any great extent until it has assumed the same responsibilities as other common carriers as regards taxes, regulations, etc. Truck haulers soon will accept such responsibilities, Mr. Wright thinks, because motor truck interests have declared themselves in favor of such a development and because it is necessary to proper utilization of the truck's ability.

## Trucks Cut Handling Costs

Illustrating the efficiency of door to door service, Mr. Wright pointed out that the ordinary l. c. l. shipment on the railroad necessitates eight separate handlings of the material, while a door to door delivery system would involve only two.

He outlined the experimental work undertaken and contemplated by the Pennsylvania Railroad in coordination of truck transport with present rail facilities. The field of the motor truck, he said, may be divided into three parts:

1. For hauling l. c. l. freight.
2. For terminal to terminal hauling.
3. For door to door hauling.

The Pennsylvania Railroad has been operating trucks to haul l. c. l. freight for some time in four or five different areas, the truck runs averaging 30 miles or less in each case. He cited the Philadelphia to Downingtown experiment as a specific example of a successfully operating service. The freight trains now drop and pick up freight at only four terminals along this route, instead of stopping at every local station. The trucks take the freight from the four express stops and deliver it to the local freight stations along the way. The consignee still has to take the goods from the local freight station to his own place of business.

This experiment was undertaken first because it necessitated no change in equipment and no added expense.

Experiments are contemplated in use of trucks for terminal haulage, Mr. Wright said, while door to door delivery is looked upon very favorably so long as the railroads are not required to go into the trucking business. Any such service, in Mr. Wright's opinion, must come about as a result of coordination of independent truck carriers with the railroads.

The independent units Mr. Wright would call rail-motor lines. Details as to how they should function and as to their specific relation to the railroads still remain to be worked out, he said, but there is no doubt about the benefits to be derived by the carriers and the public from such service.

The l. c. l. experiments will be extended, Mr. Wright

said, and will be installed wherever the volume of traffic warrants. The railroads will encourage the truck lines cooperating with them to contract with consignees for delivery from the express station to the consignee's door. In this way it is hoped eventually to have the trucks handle a large share of the l.c.l. business.

J. F. Murphy, Columbia Terminals Co., St. Louis, said that existing facilities should be utilized in the development of truck haulage between terminals. His company is hauling more material today with 200 trucks, he said, than it did six years ago with 600 horse teams. Organization has relieved traffic congestion and increased very greatly the load efficiency of the trucks.

One automotive shipper stated his belief that a door to door service on l.c.l. freight would mean the beginning

He pointed out that terminal facilities have not been increased materially in forty years, despite the fact that the freight handled has grown enormously. He believes that tractors and semi-trailers, operated in coordination with the railroad facilities, constitute the only means of solving the problem of terminal congestion. He indicated that the railroad should accept responsibility for door to door shipments.

The country must not wait for a transportation crisis, Mr. Sangster said, before taking definite steps to relieve terminal congestion. He said that it would be to the interest of the carriers to sell their expensive down town property and invest that money in outlying terminals. This is the method used in St. Louis, the goods being handled by tractors and semi-trailers from these outlying points.

The city government in St. Louis, he added, has never refused to close an alley or a street which was needed as an approach to one of these terminals when the facts of the case were laid before the proper authorities.

## Buses Can Handle Mass Transportation Properly

MANY of the trolley lines in existence probably never should have been built, said Mr. Emery in his talk before the motorbus session. Half of the electric railways now in operation are not producing a profit and there is every indication that many of them will be replaced by buses when the time comes to renew trackage. Until that time, however, the electric cars probably will be continued.

There is no good reason why buses should not replace electric lines entirely in certain instances, Mr. Emery said, if the buses are large, comfortable and reasonably cheap to operate. Body design is one of the most important problems in the bus field, however, and considerable attention should be given to this matter in the near future.

Motorbus handling of mass transportation has been of an emergency character in many instances up to the present time, Mr. Emery pointed out. The fact that it has not been entirely successful when called upon as a complete substitute for electric lines is not conclusive evidence as to its inability to handle mass transportation under other conditions. Proper organization and equipment are essential to successful motorbus operation and bus lines with these characteristics have a wide sphere of usefulness before them.

The future of the motorbus, Mr. Emery showed, is particularly bright because of the greatly increased cost of constructing rail lines. The last few years have witnessed an almost complete suspension of building activity on the part of the electric railway companies, so that their facilities have not been extended to take care of the constantly increasing traffic.

A population of 15,000 per mile is needed to insure profitable operation of an electric railway, Mr. Emery said, while a bus route can be operated successfully on a one-hour headway with a population of 250 per mile; on a two-hour headway with a population of 150 per mile.

The motorbus can serve effectively in the following ways, Mr. Emery said:

1. To provide transportation for suburban and outlying territories in cities and thus make possible realization of the plans of city planning commissions.
2. As feeders for electric railways, bringing passengers to the electric lines. When used in this way it is not always necessary for the bus line to be self-supporting.



Robert C. Wright told how the Pennsylvania Railroad is using trucks successfully to handle l.c.l. freight

F. C. Horner, General Motors Corp., organized and presided at the truck transportation session

R. D. Sangster, St. Louis Chamber of Commerce, outlined methods used to relieve terminal congestion

of a new era in transportation. L.c.l. shipments, he said, always have been unreliable, and a real dependable service would be a boon to shippers. Mr. Wright agreed with this statement and said that he believed such service would come.

Replying to a question as to maximum range of truck haulage efficiency, Mr. Wright said that no one could give a definite figure because the range depends upon a combination of factors. Under some conditions the effective range might be less than 10 miles, while under other circumstances it would be very considerably greater. He does not believe enough data are available yet to make any definite statement along this line, but said that the Pennsylvania Railroad experiments are being made with distances of 30 miles or less.

John Younger added that the character of the goods to be hauled had much to do with the effective range of the truck, as the relation of packing and handling time to the length of haul is an important factor.

### Sangster Outlines St. Louis Plan

Mr. Sangster told how the terminal problem has been successfully solved in St. Louis through the use of tractors and semi-trailers and outlined briefly the methods in use by the Columbia Terminals Co. He said that the Endicott-Johnson Shoe Co. recently chose St. Louis as the site for its western plant because of the freedom from terminal congestion found there by executives.



3. For special services such as hotel and school use.
4. As auxiliaries for electric lines during rush hours or over certain heavy-traffic routes.
5. To provide a quality service, giving better accommodations at a higher rate of fare.
6. For emergency operation when electric lines break down.

These functions are open to the bus in addition to that of handling mass transportation in certain instances as already outlined.

Col. H. W. Alden, discussing Mr. Emery's talk, said that a line of trolley cars placed end to end for a block in Detroit will seat only half as many people as a line of Detroit buses similarly placed and that the buses will seat 15 per cent more people than the trolleys with people packed in them. There is not the slightest doubt, Colonel Alden said, that buses could handle the crowds in Detroit better than the electric lines out to a certain distance from the center of the city.

Mr. Horine pointed out the advantages of buses over trolley cars from a safety standpoint. Persons boarding trolleys are always in danger under modern traffic conditions, particularly in those cases where cars are running on narrow streets.

Mr. Plimpton, who recently has studied the school bus field very carefully, stated his belief that this work eventually should be a common carrier proposition. The schools are operating buses now, he said, in a relatively inefficient manner.

## Steam Will Be Motive Power of Future Buses

MR. MEADE was unable to be present and his paper was read by F. C. Horner. Stating his belief that steam will be used widely in motorbuses in the future, Mr. Meade said:

"I shall be greatly surprised if steam generated by low grade fuels does not soon come into its own. With its infinite flexibility in the application of power it ought to be the ideal source of propulsion for heavy road vehicles."

Because of the need for wheel pockets of inordinate size, Mr. Meade does not believe the balloon tire ever will be suitable for use with double-deck buses, but considers this fact unfortunate.

Mr. Meade gave an interesting detailed outline of the development of the motorbus from the time the double-deck type had its origination in England through its development in the United States during pre-war and post-war days up to the present time.

V. E. Keenan, United Railways Co., Providence, discussing Mr. Meade's paper, outlined the successful operation of a combined rail-motor line in Providence and emphasized the fact that the engineer should consider maintenance problems very carefully when making his original design.

Closing the discussion, A. F. Masury, who presided at the motorbus session, said that the small operator is the most important factor in the business today.

## Three Topics Analyzed by Passenger Car Men

*Control of detonation under high compressions, cooling methods, and constant compression engines are subjects discussed. Some engineers think turbulence in combustion chamber undesirable.*

MEANS for controlling detonation under high compression pressures, the essentials of a successful constant compression engine, and notes on engine cooling systems were the subject of about the same amount of discussion at the passenger car session.

Among the interesting conclusions arrived at in the paper dealing with the first of these subjects is one to the effect that poppet valve engines with properly cooled combustion chambers, spark plugs and valves, when using present-day low grade fuel, can be run with compression pressures of 100 to 110 lb. without requiring unduly frequent decarbonization. If hot spots are eliminated, properly designed spark plugs used and the fuel mixture cooled before it enters the cylinders, a maximum compression pressure as high as 125 lb. per sq. in. can be used successfully in the case of sleeve valve engines.

Judging by the number of questions asked of and answered by C. E. Sargent there is no little interest in the subject of constant compression engines. Although there was some adverse criticism of the type described by Mr. Sargent, it appeared to be the sense of the meeting that constant compression engines in general are well worth further study.

Some of those who entered into the discussion at this session seemed inclined to consider turbulence in the combustion chamber of engines a rather undesirable characteristic. In answer to this criticism A. B. Fisher stated that it has proved possible to increase the power and decrease the fuel consumption of some engines simply by fitting a head specially designed to increase turbulence.

That portion of N. S. Diamant's paper which dealt with steam cooling systems appeared to create the most interest. In this connection Dr. H. C. Dickinson called attention to the fact that higher jacket water temperatures have a tendency to decrease crankcase oil dilution. He said that automotive radiators perform well as steam condensers and that the more rapid circulation set up when steam is generated may well prove to be one of the advantages of this type of construction.

## Factors Which Affect Detonation Are Discussed

FURTHER research on factors affecting detonation in engine cylinders, carried out at Purdue University, was reported on in a paper by J. H. Holloway and Prof. G. A. Young. A report covering the first part of this investigation, which was made on a six-cylinder  $3\frac{1}{4}$  by  $4\frac{1}{2}$ -in. poppet valve engine and a four-cylinder  $4\frac{1}{8}$  by  $4\frac{1}{2}$ -in. sleeve valve engine, was presented at last year's annual meeting in New York. The later paper relates to results obtained since that time. Both of the engines tested were fitted with special cylinder heads giving a compression ratio of 6.75 to 1. In the tests carried out during the past year the Willys-Knight sleeve valve engine was replaced by one of smaller bore ( $3\frac{5}{8}$  in.) with a special high-compression head.

Various changes were made in the accessories, as compared with the set-up used in the 1922 tests, some of them

in order to meet more closely practical requirements. The water jacketed intercooler between carbureter and inlet manifold was replaced by an air-cooled intercooler, and the hot-spot by an exhaust-heated vaporizer. A conventional cooling system and battery ignition were employed. Toward the end of the 1922 investigations the spark plugs were secured into the combustion chamber wall in such a way as to be in direct contact with cooling water, but this arrangement was given up in favor of the conventional one, and changes were made in the spark plug design to prevent overheating of same.

An automatic spark advance actuated by the inlet



*J. H. Halloway, joint author of paper on "Controlling Detonation"*

*G. A. Young, who collaborated with Mr. Halloway in writing the paper on detonation*

*N. S. Diamant gave some "Notes on Engine Cooling and Radiator Characteristics"*

vacuum was developed. The latest change made in the equipment consists in the provision of aluminum alloy cylinder heads with cooling fins on the inside wall and extending into the cooling water.

In the Willys-Knight engine the regular pistons were replaced with Bunite split skirt, constant clearance, aluminum alloy pistons which have steel rings cast in the aluminum alloy. A combined inlet and exhaust manifold was developed in which there is a hot spot directly beyond the carbureter, and from this point the mixture is carried through the inlet pipe around the forward end of the cylinder block to the inlet ports on the opposite side of the block.

This inlet pipe was cast of aluminum and provided with fins at the front of the cylinder block, so that the blast from the radiator fan cooled the mixture before it entered the cylinders. It is claimed that the unusual length of the inlet pipe results in the delivery of a cooler mixture to the cylinders, in a reduction in pressure pulsations in the carbureter and consequent better carbureter performance, in better intermingling of the air and fuel particles and in more nearly uniform quantitative distribution.

Special spark plugs were designed, the object being to have the flame-exposed portion of the plug reach such a temperature that any deposits of carbon would be burned immediately, yet not high enough to cause detonation. Porcelain cores were cemented into brass shells, the cores being so designed as to present the smallest possible area to the hot gases, and the electrodes were made very short. By spinning the shells, the cores were held in place mechanically. It was found that these plugs had very good heat-dispersing qualities.

In answering questions concerning his paper Mr.

Halloway made the following statements:

Mica for spark plug insulators have proved less satisfactory in respect to preventing detonation than a good grade of porcelain.

Exact measurements concerning acceleration with the inter-cooler referred to in the paper were not made, but so far as could be judged the inter-cooler did not decrease accelerating ability to an appreciable extent. The tests made extended over a sufficiently long period to permit of the formation of a normal coat of carbon. It is believed that 25 to 30 lb. more compression pressure can be carried with aluminum than with cast iron pistons.

There were ribs on the aluminum head of the Knight engine. These ribs extended into the water jacket. In general, thermo-syphon circulation is less satisfactory than pump circulation, due to the greater uniformity with the latter. Dilution with exhaust gas probably will not permit as high compression pressures as are permissible with doped fuel.

High compression pressures did have a deleterious effect on bearings and probably resulted in slightly more vibration over the entire speed range.

## Diamant Outlines the Principles of Cooling

**N.** S. DIAMANT, consulting engineer of the Jamestown Car Parts Mfg. Co., presented "Notes on Cooling Systems of Engine Cylinders and Fundamentals of Operating Characteristics of Radiators." The paper was divided into two sections, Part I being devoted to a theoretical analysis of the problems of temperature drop and heat transfer in air, water and oil-cooled cylinders, and Part II to a discussion of radiator performance from the viewpoint of designers of passenger cars, trucks and tractors.

Considerable attention was given in Part I to that comparatively new form of engine cooling, steam cooling, the characteristics of which system were summarized as follows:

(1) The temperature of the water in the jackets of the engine is constant, irrespective of load, speed or weather conditions.

(2) Normal operating temperature of the cooling liquid is quickly attained and the time taken to reach this temperature is little affected by weather conditions.

(3) The engine cools down very slowly, compared to the present water-cooled system; in the case of tractors this has the added advantage that it facilitates starting on kerosene after a short stop.

(4) If water is entirely excluded from the radiator the nuisance of leaky cores is reduced to a minimum.

(5) With a well-designed system the water loss should be so small that distilled water could be used, thus eliminating (or at least greatly reducing) the nuisance of alkali and dirty water.

(6) The heat dissipating capacity of the radiator, for a given set of conditions, is increased in direct proportion to the increase in the temperature difference between the cooling medium in the radiator and the atmosphere.

(7) Freezing troubles are reduced, but not eliminated. The great expense of regularly replenishing the alcohol evaporating from the ordinary cooling system is eliminated, and the common danger, in thermo-syphon jobs, of freezing the radiator when an unexpected cold wave sets in, is overcome.

(8) The constant and uniform temperature of the water in the cylinder jackets no doubt greatly reduces



troubles due to unequal expansion of cylinders and pistons, crankcase dilution, etc.

(9) Finally, the terms overcooling and undercooling lose their meaning. Overcooling is impossible and undercooling would merely result in loss of steam through the vent or safety valve.

Part II, dealing with radiator performance characteristics, was also summarized, and some of the principal conclusions are as follows:

With radiators having no fins, the cooling capacity increases with the air flow in nearly direct proportion. With radiators having fins (indirect cooling surface swept by air on both sides) the cooling capacity increases less rapidly than the air velocity, the exponent of the air velocity to which the cooling capacity is proportional varying between 0.5 and 0.9, with the core construction.

The amount of air flowing through a radiator passing through still air at a car speed  $V$  depends upon the combined resistance of the core and the rest of the air circuit under the hood.

With pump circulation the cooling capacity of the radiator begins to decrease as the rate of flow drops below 3 g.p.m. per ft. width, per inch thickness of core.

For cooling passenger cars, 5 cu. in. of radiator core should be allowed per cu. in. piston displacement, and for trucks and tractors more, particularly if the fin and tube type of core is used. Another way to estimate the radiator capacity required is to assume that the heat rejected to the jacket is equal to the brake horsepower developed by the engine. It is well, however, to check such estimates by road tests.

In making road tests, temperature readings should be taken by means of long distance type thermometers every half mile or so, including the temperatures of the water in the top and bottom tanks and the temperatures of air as it enters and leaves the radiator. The relation between the top and bottom tank temperatures and the cooling capacity can then be plotted, and by means of the curves obtained it is possible to answer such questions as the following: If a radiator under certain conditions of road test reaches a temperature of 200 deg., for instance, how much larger must the radiator be in order that this temperature may not exceed 180 or 190 deg.?

In response to a request of Chairman Little, Dr. Dickinson of the Bureau of Standards, made some remarks concerning steam cooling systems which may be summarized as follows:

Higher jacket water temperatures have a tendency to decrease crankcase oil dilution. Radiators have been shown to act well when used as steam condensers and to dissipate somewhat more heat per degree temperature difference than with water.

Water must be kept in contact with the surface to be cooled and steam pockets must be avoided. This probably is not difficult in view of the more rapid circulation which is set up.

#### Diamant Answers Questions

Mr. Diamant replied substantially as follows to questions concerning his paper: A fan is just as necessary with a steam system as with water, especially when the car is not in motion and the engine is running. The use of alcohol in a steam system will tend to lower the temperature, but otherwise has no disadvantages as compared to water only.

The types of fans referred to in the paper are said to be exactly comparable. In steam systems less radiator capacity is required on account of the greater temperature difference.

One member stated that he had employed oil as a

cooling medium with success both in summer and in winter. Because of the variation in viscosity with change in temperature, oil circulates more slowly in winter and more rapidly in summer. In the case cited it automatically maintained the engine jacket within 10 deg. Fahr. of a constant temperature under variations in air temperature of 50 deg. Fahr.

Another statement based on experience with oil as a cooling liquid was to the effect that, although it maintained a temperature 13 deg. higher than that of water, its lower specific heat is offset by more rapid cooling in the radiator. Its higher boiling temperature also enables a higher engine temperature to be maintained.

C. W. McKinley asked how a steam system can be used when the formation of steam in a water system causes detonation and other trouble. Herbert Chase, in discussing this point, said that there is a quite general misunderstanding in this regard. Overheating in water systems is caused as a rule by steam pockets. In a properly designed steam system the jackets are kept full of water and the pump, jacket and piping are so arranged as to avoid steam pockets. In fact the flow is greatly accelerated by the steam itself.

## Advantages of Constant Compression Engine Given

C. E. SARGENT, a research engineer, outlined "The Essentials of a Successful Constant Compression Engine," and pointed out that such an engine would be advantageous from two points of view: By keeping the compression up to the maximum when running under small loads (which it is proposed to accomplish by the use of a stratified charge, filling the lower part of the cylinder with pure air and the upper part with a combustible charge of normal richness), not only will the thermal efficiency be increased directly, but the greater part of the pumping loss during the inlet stroke, which reaches considerable values when running on low throttle, will be eliminated.



T. J. Little, Jr., presided at the passenger-car session. He endorsed Mr. Perrot's views on four-wheel brake design

C. E. Sargent outlined the "Essentials of a Successful Constant Compression Engine"

To test his theories, Mr. Sargent rebuilt an Erd four-cylinder engine which has the inlet valve in a side pocket and the exhaust valve in the cylinder head. In the space under the inlet valve was placed a rotary

valve which places the inlet port in communication successively with the atmosphere and with the carbureter. This rotary valve is driven from the camshaft through a pair of helical gears, and by raising and lowering the driven helical gear the timing of this valve can be varied. Under full-load operating conditions the opening of the rotary valve coincides with the opening of the intake valve and it is only combustible charge which enters the cylinders.

When the engine is throttled the rotary valve is retarded by lifting the driven gear of the rotary valve drive, with the result that during the first part of the inlet stroke the combustion chamber is in communication with the atmosphere, and pure air enters the cylinder. Before the communication with the atmosphere is shut off, communication with the carbureter has been established and a charge of combustible mixture enters during the latter part of the intake stroke, this mixture remaining near the top of the combustion chamber, it is claimed. Two of the rotary valves in the four-cylinder engine are rotated in one direction and two in the other, which eliminates a tendency of the drive reactions to affect the position of the control gear.

Turbulence ordinarily increases the thermal efficiency with liquid fuels, but when a stratified charge is desired it is out of the question. Turbulence has the effect of improving the intermingling of the fuel and air particles, and where the gas must be kept quiescent it is necessary

that the fuel be thoroughly gasified before it enters the cylinder.

In a written discussion presented by Prof. P. H. Schweitzer the disadvantages of mixture control were summarized.

Mr. Sargent said that turbulence is not needed so long as complete combustion is obtained. Inflammation, he added, can be too rapid and produce undesirable results.

Mr. Sargent said that some carbon had been found in the heating chamber referred to in his paper but not enough to do harm. Data concerning the fuel consumption at part loads is not now available. The camshaft is said to be almost as cheap as the ordinary one and the tapered cams and rounded cam-followers as yet show no evidence of rapid wear.

In answer to other questions, Mr. Sargent made the following statements. The fan does not cause sluggish acceleration. The engine employed uses 90 lb. compression pressure. It has run at speeds from 300 to 1000 r.p.m. and with one of the valves employed it ran down to about 100 r.p.m. Ordinarily, the fuel thrown out of the air stream by the fan does not return to the carbureter.

A. B. Fisher, in reply to some statements concerning turbulence stated that experience with what he termed the Ricardo head has indicated that it is desirable to have a high degree of turbulence, since an engine of this design has been shown to develop more power at the same speed and to consume less fuel per horsepower developed.

## Two New Production Processes Developed

*Special hot swaging machine and method for making permanent-mold castings presented at production session. Other topics are fender enameling, management, machine tools, and gage checking.*

**D**ESCRPTION of a new hot swaging machine, designed to produce stronger live rear axle shafts at lower cost; an outline of a recently developed process for permanent-mold castings; and a presentation of the details of the methods used by Chevrolet in fender and body enameling, were features of the production sessions held during the closing hours of the convention. While attendance at the production meetings was relatively small, considerable discussion developed as a result of the very practical character of the material presented.

Greater responsibility for the individual as a means of increasing manufacturing efficiency was another thought developed, while the need for more careful study of materials and purchasing was emphasized.

Faults and remedies of present machine tools were discussed, as were problems of material handling and gage checking.

K. L. Herrman, Studebaker Corp., presided at the first production session, while the latter two were handled by John Younger, *Automotive Abstracts*, and Eugene Bouton, Chandler Motor Car Co., respectively.

### Hot Swaging Produces Shafts at a Low Cost

**H**OT swaging produces stronger live rear axle shafts at a reduced cost, although some further development work is required to bring this type of machinery up to existing standards. This was the outstanding thought of the paper on "Hot Swaging" which was presented by R. A. DeVlieg of the Maxwell Motor Corp. He recited the experience of that company in the rough forming of more

than 125,000 shafts. Of the four existing methods of roughing live axle shafts, hot swaging is much cheaper than rolling, forging in steam hammers or turning in the most modern lathe equipment.

Practically no stock is wasted, as the original bar in its case is 8 in. shorter and 1/16 in. larger in diameter than the final axle and only about 3/4 in. is sheared off of the small end. The physical properties of the steel are improved by about 15 per cent. Although the bar is twisted to some extent in this process, no unfavorable characteristics result. Maxwell regularly uses shafts which are twisted through one to three revolutions. One shaft which was twisted through six revolutions showed no decrease in properties upon test.

The hot swaging machine is to all intents and purposes a larger edition of the cold type machine with provisions for holding the red-hot shaft. The shaft is held in a powerful collet which is centered in an extension of the swaging head centerline. Means are provided to brake the rotation of this head as the end of the shaft enters the dies. Three of these machines are in operation, each adjoining a furnace and being operated by one skilled man and a heater. The axle is processed through three stages to produce the long taper between the inner splined portion and the bearing mounting and the shorter taper at the outer end for the wheel mounting. The average production rate is 70 pieces per hour and the larger dies produce 5000 to 6000 pieces per seating while the smaller dies produce about 10,000 pieces per run.

As with any new process, some trouble must be expected from the equipment. Spindle bearings, cage and head rollers have been the big mechanical offenders, and lubrication is rather imperfect. Great attention must be



given to the collet which retains the shaft, because of the reduction in diameter as it cools. Manufacturers anticipating the use of this type of equipment must set up their tentative production costs with realization of the fact that practically no experienced operators are available, and since there is no adequate knowledge of the machine's internal stresses considerable time is lost for repairs. Due to the latter factor, maintenance estimates should be based upon forge shop instead of machine shop standards.

## Castings Produced by Permanent Mold Process

**A**NOTHER advanced process was described by Daniel Meloche of the Holley Carburetor Co. in a paper, "Permanent-Mold Castings." By this process, iron castings are molded and poured with the expenditure of about one-eighth of the man-hours required by the sand-casting methods. In addition to this feature, the surface hardness which is always present in sand-molded castings is absent in the permanent-molded castings. The iron is much closer grained, soft and easily machinable and uniform throughout.

The process, which was discussed in AUTOMOTIVE INDUSTRIES of Nov. 1, involves a turntable which carries 12 permanent split-type molds. The molds are cast iron, being treated when cast so that the interior surfaces are highly refractory. In operation, the working surfaces of the molds are first coated with amorphous carbon by an acetylene flame. At the next station the dry sand core is set in one half. The mold then closes and continues around to the pouring station, where one man pours the iron from a small ladle. Next the mold opens automatically, the casting is knocked out and the mold is blown out by an air stream, ready for the repetition of the cycle.

High silicon iron is used and the carbon coating in the interior of the mold reduces the melting point and retards the cooling rate so that the casting forms before the contraction of cooling takes place. The rate and total amount of construction is only about one-fifth of that of the sand casting process. As the surface of the mold is highly refractory and coated with carbon, the heat of the incoming metal is conserved and not lost to the mold, which condition causes surface chilling and slower flow.

This process is now in operation on Holley carburetor bodies and Ford pistons. About 2500 pistons are produced per day per machine, while three machines produce more than 5000 carburetor bodies in about 4½ hours. The life of the dies is very good and more than offsets the cost of high grade metal pattern equipment of the sand casting method. About 15,000 pistons are cast before the dies are remelted. In discussion Mr. Meloche stated that he already has experimented with the pouring of malleable iron and several non-ferrous metals with very good success and believes that commercial operation in these fields will be possible in the near future. He is of the opinion that steel castings can be made by the same method providing complicated castings have some cores. The process is not limited to operations on small castings but is even better suited to the production of large castings. Iron castings weighing about 25 lb. have already been produced with every degree of success.

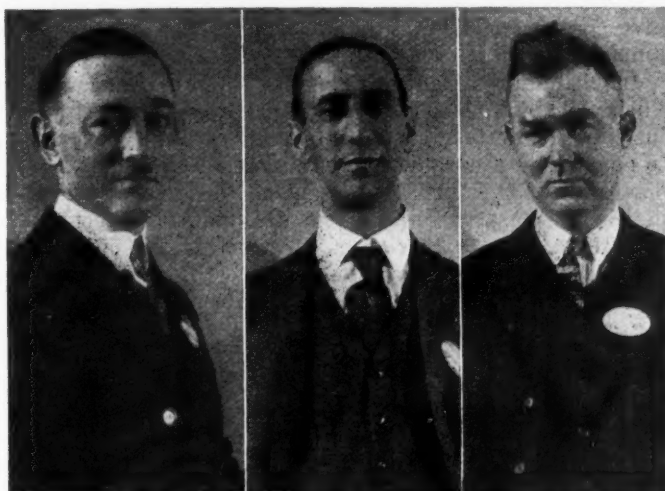
## Chevrolet Enameling Outlined by Lefebvre

**G**ORDON LEFEBVRE'S paper described in considerable detail the process and equipment for fender and body enameling employed in the various assembly

plants of the Chevrolet Motor Co. It dealt also with improvements made in this equipment in recent years and gave the reason for selecting the types of oven and other installations now employed.

Two coats of asphaltic base enamel, baked at 450 deg. Fahr., are used on fenders and other stampings, forgings and malleables. On the body, which contains 121 lb. of wood and 125 lb. of metal, three coats of the same enamel are applied and baked at temperatures ranging from 290 to 350 deg. Fahr. A set of sheet metal for a complete car includes 11 pieces weighing 105.3 lb. and a set of 14 small parts weighing 45.5 lb.

On account of the limited number of coats used, great care is necessary to avoid defects in the sheet metal



A. A. Brown,  
author of paper  
on "Flexibility in Handling Production Material"

Thos. Nadin,  
who gave  
"Suggestions to Purchasers and Users of Tools"

Joseph Lannen  
described methods of operating a gage checking department

which often are exaggerated rather than hidden by the enamel.

Ovens for both sheet metal and body enameling are located in such a way as to minimize handling of finished parts. On this account reservoirs of finished parts are not maintained, but operations are synchronized to give a continuous flow to the assembly line.

Sheet metal parts are put through a washing machine, where they are cleaned by a washing compound, rinsed in clean hot water and then dried in an oven at 400 deg. Fahr. This eliminates hand wiping and seam-blowing and the parts are ready for tack ragging and dipping. Bodies are washed before flowing by use of rags moistened in high test gasoline.

The latest ovens for baking enameled parts and bodies are of the tunnel type, placed on the roof in some cases, and are provided with inclined ends opening on the floor below and thus giving a seal which minimizes heat losses and makes the oven easy to ventilate and control.

Inner shells of ovens recently installed are of 22-gage steel. Against these are laid 2-in. magnesia blocks, a layer of expanded metal lath, and a second layer of magnesia blocks 1 in. thick in the case of body ovens and 3 in. thick in case of fender ovens. There is then a ½-in. coat of asbestos plaster over wire netting and a finish coat of half-and-half asbestos and cement plaster. This gives a wall without any through metal and having low thermal conductivity.

In concluding his description of the conveyor equipment employed, the author says that each piece should be studied carefully to insure the best hanging position

and hooks so designed as to give the greatest number of pieces per hook, since it costs as much to operate the equipment at 80 per cent capacity as at full capacity.

The system of handling enamel described in the paper is said to insure absolute cleanliness and safety, as well as to prevent wastage and to provide a centralized and economical method of operation.

In all except one obsolete oven in the Chevrolet plants electric heaters have been abandoned in favor of indirect oil fired hot air heaters which are hand-controlled. Labor cost is said to be about the same per unit produced, but fuel cost is much less. There is also an improvement in hardness, depth and luster of baking, as well as in the rate of production.

The paper is concluded by a description of means for fire prevention, steps taken to insure cleanliness and give good ventilation, and the means used for handling finished parts.

In citing practical details from the experience at the Chevrolet plant, Mr. Lefebvre stated that when high test instead of low test gasoline is used to clean parts prior to enameling, a considerable economy results. Only about one-tenth of the former is required to perform the work of the low test gasoline. The drainage is collected and redistilled for further use. The cleaning problem is capable of further solution, as costs under existing methods constitute an ordinate portion of the enameling expense. Chevrolet have attempted to remove grease by a baking process in which the parts are passed through a preliminary oven which is heated to 750 deg. Fahr. This temperature reduces the grease to powder form which may be brushed off easily. Much work has been done along this line and, although commercial results have not been attained as yet, the process offers great possibilities.

Oven temperatures are maintained at 450 deg. Fahr. for fender enameling. Bodies are enameled at 300 to 320 deg. and gasoline tanks are handled in a separate system with an oven temperature of 275 deg. Although the heat is fairly high, no damage is done to the wood or glue in the body. The wood portion of the body is slushed with a commercial compound which is mixed with some waste enamel. The best results are obtained in the latest trapped or A-type ovens where the parts are brought up to the maximum temperature in a gradual way and then cooled in a like manner before the application of the second coat. Above all, the strictest measures of cleanliness and standardized routine must be maintained. Chevrolet, in addition to the plant facilities which have been adopted for these purposes, also control the specific gravity, viscosity and temperature of the enameling solution.

## Stock Inventories Are Balanced by New Method

**I**N his paper on "Flexibility of Handling Material," A. A. Brown of the Chandler Motor Car Co. described a policy in which shop foremen and other factory executives provide the impetus for insuring prompt production of balanced parts schedules instead of having these schedules forced upon them by a complicated overhead organization. A simplified material handling and delivery scheme has much to do with the success of this policy, as the departmental foreman sees his work ahead of him in the concrete rather than in record form.

This company feels that the success of any policy is dependent upon the man who pushes it through and that, since this is the case, the man should be allowed considerable latitude in his handling of incidental details. During the war, the American army was well supplied because

red tape was forgotten in the field by the individual in touch with the immediate situation. A similar thought forms the foundation of the Chandler material handling scheme. A considerable flexibility is required in any arrangement for handling material in quantities and hide-bound rules impede rather than aid commercial results.

When material is received, it is immediately placed on skids—or special racks in the case of crankshafts, etc.—and delivered to the point of the first operation. This delivery, of course, follows receiving inspection and counting or weighing. The inspector in the receiving department is a broad-gaged man who is familiar with conditions in the plant and modifies the delivery to suit internal conditions. When this material is delivered, it constitutes a notice upon the entire department that certain work must be anticipated. Delivery is accomplished by electric lifting or power trucks, since this company feels that hand trucking has no place in modern material handling.

Shortage lists, rather than the usual complicated perpetual inventories, are used as the material accounting system. Only the purchasing department maintains a stock list and invoice list. All withdrawals of material for any purpose, including service replacement parts, are entered in this record. Additional material is purchased in accordance with specified schedules. Stockrooms are not maintained for their record value but as strategic storage points and as preventives of theft of valuable small parts. Three shortage lists are corrected daily. The first shows parts which are not on hand for 300 to 500 cars, the second, which is more serious, covers a range of 100 to 300, while the third, which is the acute list, indicates shortages for the production of 50 cars.

This system has succeeded in making every shop executive a potential stock chaser. It has resulted in materially reduced inventories and low capital investment. While the physical aspects of the stock are somewhat disconnected, the morale of the entire organization is high. Instead of one or two "pushers," a complete organization of "pullers" is engaged in maintaining balanced scheduled output. Stock chasers in this plant are engaged only in obtaining delivery of outside material.

## Remedies for Machine Tool Defects Given

**M**ORE thorough and more automatic lubrication and better cutting lubricant systems are the chief points in machine tool design which need attention, according to Thomas Nadin, superintendent, Rolls-Royce Co. of America, who presented "Suggestions to Purchasers and Users of Machine Tools." Mr. Nadin said in part:

We are all familiar with the bearing which consists of a hole drilled and reamed in a cast iron boss in which a shaft revolves. For the lubrication of this bearing, a small hole is often drilled, and is sometimes provided with an oil hole cover of some kind. Such a bearing, if properly proportioned is suitable for low speed intermittent work, but to employ it for constant running at medium speeds is obviously wrong.

A remedy for such a trouble in stationary bearings would be the use of a felt pad of liberal size on the lower side of the bearing. The pad may be cylindrical in form and kept in contact with the shaft by means of a spring. If the bearing has an open end, it should be covered in by means of an oil-tight cover to exclude dust and retain oil, and means provided to return the oil to the reservoir in which the felt pad is located.

The other end should be provided with a cover closely fitting the shaft, and means provided to return the used oil



to the central reservoir. Such a scheme is in common use on small motors, and works very satisfactorily.

A still better construction would be to make use of a self-oiling bearing similar to those used on electro motors and lineshafts or to use a roller bearing or a ball bearing.

For loose pulleys and similar running bearings, use should be made of roller bearings for slow and medium speeds, or single row ball bearings for higher speeds. Such bearings, however, require careful design to give satisfactory service.

The question of the exclusion of dirt, water, etc., from ball or roller bearings is of supreme importance, and ranks equally with the retention of lubricant.

Most modern machines are provided with a more or less complete system for storing a supply of compound or oil, a pump and piping to deliver to the point of contact between the work and the tool, and means for returning the compound to the storage tank. The pumps are usually of sufficient size to give a proper stream, but the guards and channels, more often than not, are insufficient to take care of the splash and return. The filter is often of microscopic size and very rapidly becomes choked in use. The operator cleans it once or twice after the lubricant supply has failed, and then removes or pierces the filtering medium in desperation.

#### Destruction Extensive

The destruction, unfortunately, goes much farther than this. In machines using oil and improperly guarded, we find the spindle bearings, slides and screws all badly worn, due to the presence of so much solid matter in the cutting oil. Guards for the splash and slides are mostly inadequate, and it seems almost a matter of course to bring in a sheet metal worker and have him fit some clumsy, unsightly and troublesome splash guards as soon as a machine is installed. The channels for catching and returning the lubricant are often very poor and sometimes incomplete, requiring the use of putty or rags to insure the compound going the right way. Drilling machines and some milling machines are particular offenders in this respect. The tank itself should be of liberal dimensions, and preferably be divided into two sections. The first section should receive the compound from the channels or trays of the machine, and should act as a settling tank. The compound should flow out of the first tank over a weir into the second tank in which the pump suction and filter is located. The tank should be deep, with a small cross section, rather than shallow with a large dust collecting and evaporation surface exposed to the shop.

Chips and swarf should carefully be kept out of the compound tank, and the trays and channels should be well sloped to drain the compound back.

The filter on the pump suction should be substantial in construction, with the gauze well protected, and have a filtering area of approximately one square foot.

It should be easily accessible and removable, and should be placed with the main area of the gauze horizontal with the suction above, so that chips and dirt will fall away from it, to the bottom of the tank, by gravity.

Guards of substantial construction and of ample size for protecting the slides, bearings and screws of the machines should all be of sufficient size to deal with the maximum flow at maximum working speed.

#### Flexible Metallic Hose Needed

The same remarks apply to return channels and pipes. Flexible metallic hose of adequate size with really sound joints should be used instead of rubber connections.

The use of machines equipped in accordance with these suggestions should result in a reduction in labor costs for attention and repairs, cleaner machines, a reduction in ac-

cidents by reducing the period of the hazard, and the lost time involved, and a corresponding increase in production.

Discussion of Mr. Nadin's paper developed the fact that single pulley drive designs are tending to eliminate some of the lubrication troubles described. Removal of overhead countershafting and the installation of individual motor drives are producing the same result. In addition to Mr. Nadin's comment on machine guards, emphasis was placed on the apparent discrepancies in State safety regulations for the installation of belt guards, etc. It was suggested that buyers place a specification requiring compliance with the local regulations on all of their orders for machine tool equipment. Aside from the question of guards, clean plants were urged as the greatest contribution to accident prevention.

## More Study Needed of Buying and Materials

**F**AR greater reductions in manufacturing expenses can be made by careful attention to purchase of materials than by reducing labor costs. This important point was emphasized by E. H. Tingley, Delco-Light Co., in his talk on "Reducing Costs by Efficient Management." In the Delco-Light plant, Mr. Tingley said, 52 per cent of all the expenditures are for materials and only 9 per cent for labor. Consequently, a good deal of money can be saved quite readily by study of material prices rather than by putting great effort into cutting labor costs, since the latter affect the selling price of the product to a very limited extent.

Mr. Tingley described the military type of organization in use at Delco-Light, showing that the operation functions are divided into four major groups:

1. Engineering.
2. Finance.
3. Manufacturing.
4. Sales.

At the head of each of these divisions is an executive who has complete responsibility for the performance of the departments under him. These division heads form an advisory staff for the general manager and keep in close contact with one another through weekly conferences.

Throughout the organization the principle is preserved of giving a man complete personal responsibility for the activities in his charge. Every effort is made to provide conditions under which he can successfully measure up to that responsibility.

#### Employment Manager Is Advisor

The employment department, for example, acts only in an advisory capacity to the foreman in hiring men. Since the foreman is held responsible for the results produced by his department, it is felt that he should not be required to take as an employee any man not satisfactory to him. Consequently, the foreman usually interviews the skilled men before they actually are hired. Such an interview usually is considered unnecessary in the case of common labor.

Every man discharged, however, has to go through the employment department. The foreman has absolute authority to dismiss a man from his department. The employment department may place the man elsewhere in the plant, however, if such action seems advisable.

The purchasing department is subsidiary to the materials division. Since the factory is responsible for efficient production, it is felt that it must have control of the purchase and selection of the materials which must be

in accordance with the engineering specifications. The inspection department reports directly to the general manager.

When an improvement in the production is contemplated, a questionnaire is sent to all the division heads. Each has an opportunity to consider the question thoroughly from the standpoint of his particular division, to make a note as to the effect it will have on the activities under his supervision, and to express his opinion as to the advisability of making the change.

These recommendations are analyzed carefully by a man in the comptroller's department, who views them from the standpoint of final profits. In some cases it may be advisable to scrap a large inventory if necessary to take advantage of some immediate sales possibility; in other cases the change may be made gradually. After analysis from the standpoint of profits the recommendations go to the general manager, who is the final authority.

## Accuracy Achieved in Crankshaft Production

CRANKSHAFT manufacture from the shop angle was discussed by T. M. Carpenter of the Saginaw plant of the General Motors Corp., in his paper "Crankshaft Production Problems." He described the sequence of operations in a plant devoted to the manufacture of several types of shafts. In view of the close limits which now are required by companies using interchangeable bearings, the problems of the shop have become more difficult, particularly as the shaft can not be salvaged to an undersize class. Present day standards of balance also have served to increase the element of production costs. Mr. Carpenter's company has adopted the scheme of making machine settings from the center bearing, since the increments of error do not pile up as they do when all dimensions are indicated from one end of the shaft.

Operations in this plant are carried on in accordance with the following general plan. Shafts are straightened and marked by the forge shop to insure even distribution of mass and cleaning up at every finished surface.

### Center.

Rough turn center bearing. This work is done with a special head having one full width tool at the front and two at the rear, being fed straight in. The cutting rate is very rapid as 3.14 lb. per min. are removed.

Rough all bearings to .0025 in. oversize.

Drill oil holes. Heavy center drills are used and the feed is accomplished by hand.

Burr and blow out oil holes and inspect.

Static balance. This is a rough operation which tends to improve the alignment in grinding.

Grind all pin bearings.

Secondary turning operations including the flange, oil slinger and front end. The head and center bearing index of the lathe is fixed and the longitudinal location of the shaft is accommodated by a threaded center in the headstock spindle.

Finish grind line bearings.

Drill flange.

Balance dynamically and statically.

Hand buff all ground bearings.

Oil and place in racks for shipment.

## Gage Inspection Brings Economies in Production

AS a plant grows and its outside contacts increase in number, the need for adequate standards of dimension and interchangeability becomes increasingly important. Gages constitute the means for maintenance of these

standards and like all other equipment will not function unless given periodic attention. The tool room and inspection department see only their own problems and therefore take care of only their own gages. The remedy for this condition, as worked out in the Paige-Jewett plant, was described by Joseph Lannen in his paper, "Installation and Operation of a Gage Checking Department."

When this department was established several years ago, it was found that many current gages were worn out and that many obsolete gages were still in the shop rather than in a satisfactory storage department. A man of considerable mechanical ability was assigned to correct this situation and proceeded to round up all of the gages in the plant. Obsolete gages were stored in the new department while current gages were checked and corrected or scrapped as the requirements of each case demanded.

At the same time, each gage was recorded in a card index, each card carrying the complete history of the gage with its dimensional requirements, number, location of the operation for which it was designed and the dates of inspection and correction. This system has been continued and now is cross-indexed with another card file which lists all gages in order of dimension.

Unsatisfactory gages, which could not be immediately replaced, were painted red and returned to the operation until a new gage could be supplied. Satisfactory gages were and still are coated with prussian blue at the gaging surfaces. This coating demonstrates the amount of use received by the gage. In some cases, a gage is found non-essential and returned to the gage department. In others the continued coating of the gage surfaces indicates that the operator is not using an essential gage and steps are taken to correct the omission. The coating also acts as index of the necessity for re-calibration.

### Two Men Inspect All Gages

At present, two men inspect all gages in the plant at regular intervals, noting the date on the index card each time. Shop employees are not permitted to present gages at the department for inspection until they have written authority from the foreman. The department is equipped with a complete line of precision instruments and checking



E. A. Johnston, Chairman, Standards Committee

devices. Johanssen blocks, plug and snap gages are used as the standard of comparison. In addition to the periodic shop gage inspection, employees' micrometers and indicators are inspected and repaired as required. All sclerometers throughout the plant are cleaned and tested each day to insure the absence of dust and dirt which seriously impairs their accuracy.



## Cooperation Urged in Tire Standards Work

*Speakers voice belief that best results will be attained if passenger car and tire company engineers get together on balloon sizes. Other standards are accepted without debate.*

**R**EPORTS of the thirteen divisions of the Standards Committee were accepted in whole or in part with an unusually small amount of discussion at the Standards Committee meeting. The report of the Tire and Rim Division provoked the only discussion of any account during the entire session. Divisions reporting were those covering agricultural power equipment, axles and wheels, frames, engines, lubricants, motor boats, non-ferrous metals, passenger car bodies, parts and fittings, storage batteries, screw threads, electrical equipment and tires and rims.

The Tire and Rim Division submitted a set of five-passenger car pneumatic tire sizes and five truck sizes. The passenger car sizes are on 23-, 24- and 25-in. wheels and the motor truck sizes are all on 24-in. wheels. These sizes are in common use today, but do not include any of the so-called balloon sizes. This report carries on the work of the special committee, consisting of representatives of the Rubber Association of America, the National Automobile Chamber of Commerce and the S. A. E., which prepared a report in January, 1922, to the Standards Committee, covering a revised standard list of pneumatic tires and rims. This report was not acted upon at the January, 1922, meeting of the Standards Committee, however, because it was withdrawn upon the request of a committee of representatives of tire companies just prior to that meeting, to allow the tire committee time to prepare and submit to the society a recommendation which it thought would represent desired practice for a longer time to come.

### Action Decided Upon

Since no report has been received from the tire manufacturers committee since that time, the Society has endeavored to determine upon a standardization program which would be satisfactory to the various organizations interested in tire and rim matters. Believing that it would be advisable for the Society to have a division which might represent the tire users in the meantime, the Tire and Rim Division was reappointed in April, 1922, headed by J. G. Vincent. In the report of this Division it states that although no agreement has been reached as to standardization procedure in tire and rim matters outside of the regular S. A. E. procedure, the Tire and Rim Division has considered it vitally necessary to revise the important tire and rim standards now contained in the S. A. E. Handbook. At a meeting held last September in Cleveland revisions of the existing tire and rim standards were suggested. In many cases it has been considered desirable to revise the S. A. E. standards and recommended practices to conform to those of the Tire and Rim Association of America, especially in the case of those standards in relation to details of design that do not affect interchangeability in tires, rims and wheels.

Correspondingly, the division reports the five tire sizes shown in the schedule. Considerable discussion arose on these sizes, particularly as regards including

the 30 by 3½-in. straight side tire, which J. E. Hale pointed out is an existing size being used as standard equipment on the Chevrolet car. This size was added to complete the list, making a total of six.

### Truck Sizes Debated

Discussion also developed on the truck tire sizes as to whether or not it would be advisable to withhold action at the present time in order to get more data on the 20-in. wheel. Mr. Vincent pointed out that the purpose of standardizing these sizes is simply to put the stamp of approval on sizes already in use, leaving it open to add other sizes as time goes on. J. E. Hale mentioned that the 20-in. wheel is coming in very strongly for bus use. He stated that the 20-in. wheel for trucks has been discussed for some time, but that very little progress has been made because of the lack of brake drum clearance. He stated also that very few of the new trucks are using the large wheels. Arthur J. Scaife of the White Motor Co. mentioned the frequent use of the 22-in. wheel and also stated that in his belief the bus wheel is a problem apart and that the bus probably will be just as different from the truck as the truck is from the passenger car. The report of the division was amended to the effect that the 20-in. sizes are to be added subject to investigation by the Tire and Rim Division. These sizes later were referred back to the committee by the Council.

The Tire and Rim Division offered a supplementary report covering balloon tires. This supplementary report states that now is the time to standardize the balloon tire rather than at a later date, when production will have started on a larger scale and that the Tire and Rim Division of the S. A. E. Standards Committee is endeavoring to work on a cooperative basis with the rubber interests.

As has been reported in AUTOMOTIVE INDUSTRIES, the Tire and Rim Division met in Cleveland on Sept. 17, 1923, to discuss the developments of balloon tires and their rims. Due to differences of opinion that were known to exist among the tire and rim companies regarding the dimensions of the tire and rims, the Division believed that a suitable standardization program should be set up in regards to practice of tire and rim manufacturers and car builders. Early in December the Society received some information in the form of a general bulletin issued by the Rubber Association giving a recommendation of the executive committee of the Tire Division of the Rubber Association as concurred in by the Tire & Rim Association of America. The bulletin was sent to the Society for its consideration and approval.

A meeting of the Tire & Rim Division was held with engineering and executive representatives of car manufacturers in New York on Jan. 9. The results of this meeting were reported in AUTOMOTIVE INDUSTRIES for Jan. 10. As stated, the Tire & Rim Division of the Standards Committee feels that at best the problem of balloon tires and rim and wheel diameters is still in the

development stage and that specifications approved at this time may require modification. However, it is desirable to have available some definite recommendation which will afford a suitable balloon tire and rim size for passenger cars. It was therefore voted that the recommendation submitted by the Rubber Association for the cross-sectional rim diameters and rim widths for balloon tires be indorsed by the Society and published in the S. A. E. Handbook as general information with an explanatory paragraph indicating that the Society approves the recommendation of the executive committee of the Tire Division of the Rubber Association as such. It was felt, however, that the Society should not fully indorse the recommendation as an S. A. E. standard or as recommended practice. The cross-sectional rim diameters and rim widths approved were printed in *AUTOMOTIVE INDUSTRIES* Jan. 10.

W. C. Keys, chairman of the Parts and Fittings Division, in making his report advised that the recommendations covering fuel and lubrication pipe fittings be withdrawn for the time being, due to a patent situation which had arisen covering the type of compression fittings proposed for recommended practice. A question remains regarding the right of several manufacturers to make and market the proposed compression type of pipe fitting under existing patent conditions. For this reason it has been decided to withhold the recommendations of the Parts and Fittings Division as regards the fuel and lubrication pipe fitting. With this exception the report of the committee was accepted.

An additional recommendation by this division, which was adopted, is contained in pages C-46 and C-47, cover-

#### Proposed S. A. E. Standard of Pneumatic Tires

Type	Nominal Rim		Nominal Tires		Tire Seat Diam., In.
	Size	Type	Regular	Oversize	
Passenger Cars	30 x 3½	C	30 x 3½	31 x 4	23
	30 x 3½	SS	.....	31 x 4	23
	31 x 4	SS	31 x 4	.....	23
	32 x 4	SS	32 x 4	33 x 4½	24
	32 x 4½	SS	32 x 4½	33 x 5	23
	34 x 4½	SS	34 x 4½	35 x 5	25
Motor Trucks	34 x 5	SS	34 x 5	36 x 6	24
	36 x 6	SS	36 x 6	38 x 7	24
	38 x 7	SS	38 x 7	40 x 8	24
	40 x 8	SS	40 x 8	42 x 9	24
	44 x 10	SS	44 x 10	.....	24

C—Clincher type.

SS—Straight side type.

ing fuel and lubrication pipe fittings in the S. A. E. Handbook from recommended practice to standard. This was also adopted, with the added recommendation that instead of calling these pipe fittings they should be known as tube fittings.

E. H. Ehrman, in presenting the report of the Screw Thread Division, of which he is chairman, asked that the section on carriage bolts be withdrawn. This was agreed to by the Standards Committee and the report of the division was accepted with this revision.

The reports of all of the other divisions were accepted without discussion.

## New Geared Head Rapid Production Lathe

A SEVENTEEN-INCH geared head heavy duty lathe brought out by the R. K. LeBlond Machine Co. has several new high production features. Chief among these is a six-speed selective geared headstock, making the machine particularly adapted to the heavier phases of plain turning and facing work. The changes of speed can be made selectively without the necessity of going through intermediary speeds.

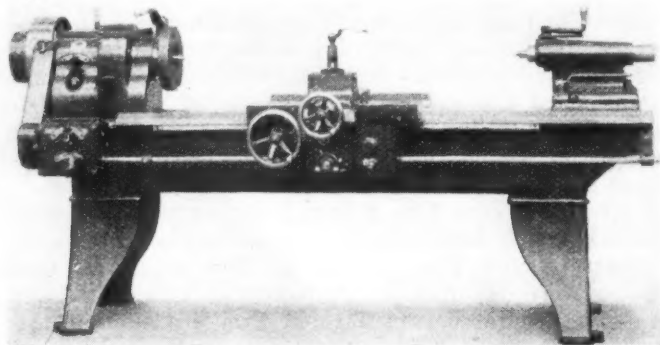
The drive is through a large pulley with a high speed belt. To relieve the drive shaft of the belt pull, the driving pulley is mounted on a substantial oil bushing and is connected to the shaft by means of an automobile type disk-in-oil clutch, which is operated by a lever conveniently located at the front of the headstock. One set of clutch disks is of steel and the other of molded Raybestos.

The headstock is of the flooded lubrication type, being filled with oil to a mark on the outside. The entire range

of spindle speeds is obtained by means of two conveniently located levers. All gears are of chrome nickel steel, heat treated. Stub form teeth are used for strength, and the ends of the teeth are chamfered for easy engagement. The gears are mounted on six-splined shafts.

Nine changes of feed are obtainable with the use of two change levers, the bottom lever compounding the range obtainable with the top lever. The feeds are graded carefully and are obtainable instantly while under load. The mechanism is driven direct from the spindle by a heavy roller chain adjustable for tension, and is completely inclosed in a cast iron guard.

The lathe can be furnished with constant speed, belted motor drive. In that case the motor is carried in the base of the head and cabinet leg, completely inclosed yet readily accessible. The drive is through a high speed endless double leather belt to the driving pulley. An idler pulley is provided for the adjustment of belt tension and to increase the arc of contact of the belt on the pulley. A 5 hp. motor running at 1200 r.p.m. is recommended.



New R. K. LeBlond heavy duty lathe

A CUTTER for cutting keyways, slots and oil grooves in any metal has been brought out by the Economy Products Co. of Newark, N. J. It has a round shank, and the cutting end is flattened and beveled and sharpened at the sides as well as at the end.

The end is beveled in opposite directions over the two halves and so as to produce a flat bottom hole. The cutters are designed to take the place of end mills, over which they are said to have the advantages of lower costs, less liability to breakage and ease of regrinding.



# Avid Interest in Motor Cars Displayed by Public at Chicago Show

Impromptu convention of Thomas Doubtful family breaks up in gloom when record crowd appears on the opening day.  
Sentiment grows for exclusive dealer exhibit.

By James Dalton

**H**ALF a dozen members of the Thomas Doubtful family arrived simultaneously in the well known lobby of one of Chicago's land-mark hotels at noon Saturday and held an informal convention. As a preliminary they removed their fur caps, mufflers, ear protectors, mittens and heavy weight "bennies" worn as a protection from the marrow-piercing blasts which rode on an eight or ten below zero temperature along the far reaches of Michigan Boulevard.

The clans had gathered from various parts of the great automobile belt of the Middle West. The ostensible purpose of the meeting was to attend the second of the 1924 national shows which was to open two hours later in the familiar setting of Coliseum, armory, alley and basement.

The Doubtfuls weren't peevisish because of the cold weather. They reveled in it. Frost, of whatever character, intrigues them.

"It's a mite chilly," averred the Chief Kleagle after salutations had been exchanged, "but it ain't a circumstance to what it's going to be down there in the Coliseum in about two hours. I tell you, people are fed up on automobile shows. They know all about all the new jobs, read about 'em in the papers and seen 'em in the show rooms, and they ain't going all the way out there to see a lot of cars."

"But," broke in a junior member of the family a little less steeped in gloom, "you know Sam Miles got an awful big crowd all the way up to that armory in the Bronx for the New York show a couple of weeks ago."

"That doesn't prove anything," continued the chief crêpe hanger. "New Yorkers are hicks anyway. They'll pay money to see anything. They're wiser out here. Guess we'd better get a bite of lunch so we can get an early start. People've bought about all the automobiles they're going to buy and business is going to be rotten from now on. A lot of these smart Alecks who figured there wasn't any bottom to it are going to get struck hard. But I'm all set. Got my inventory cleared up, haven't ordered any new stuff and if this show's a frost I'm ready for it."

## Crowds Wait for Doors to Open

After they had eaten judiciously, the half dozen hard-boiled pessimists donned their winter regalia and strolled down to the Coliseum. They didn't mind ten below zero. The colder it is the better they like it.

"Must be a fire or something," remarked the keeper of the family seals, as they hove near the grimy old building. "But I shouldn't think a lot of people would stand around in the cold like that just to see some red fire engines."

"Maybe they're waiting for the doors to open," ventured the youngest Doubtful who had maintained a discreet silence since being told New Yorkers were hicks.

Glances of seorn withered him. It couldn't be.

But it was.

The crowd on the opening afternoon and evening of the 1924 Chicago Show broke all records in spite of the biting cold. The five eldest Thomas Doubtfuls didn't even go in. Their hearts were broken and they couldn't bear the sight. Blinded by tears, they didn't notice the defection of the youngest who was sneaking through an entrance, with a grin on his face, when last seen.

Additional proof, if it was needed, has been given that the public interest in motor vehicles is not waning but is at a higher level than ever before. It was demonstrated first in New York, then in Newark, Philadelphia, Buffalo, Brooklyn, Baltimore, Detroit, Cleveland and Milwaukee. The rest of the country will swing into line as the dealer expositions are held in constantly increasing numbers.

The Metropolitan district of Chicago is just as deeply interested as was the Metropolitan district of New York. The motor car is a national institution. No one section has a monopoly on the need for individual transportation.

## Prospects Interested in Car Details

Half an hour after the doors opened the aisles of the Coliseum were filled with eager investigators, all of them potential prospects. They studied the details of engines and stripped chassis, they examined the latest ideas in upholstery and body refinements, they displayed a surprising knowledge of four-wheel brakes and balloon tires.

So far as the exhibits are concerned, there is practically nothing that wasn't shown at New York. Not quite so many models are displayed, and there are fewer parts and accessories, but altogether it is a splendid show. Chicago has never seen at one time so many new jobs and so many improvements, big and little.

Before the first afternoon was over there was no doubt it was to be a "selling show" for salesmen proudly showed names on dotted lines. And a word should be said for those salesmen. They had been taught how to sell, and it must be confessed they did a better job than their brothers in New York. They showed more careful training and there weren't many questions, technical or otherwise, which they couldn't answer.

Chicagoans, accustomed to the dismal Coliseum and the even more dismal armory, seemed to find nothing lacking in the show, but those who had seen the New York exposition in the magnificent setting of the huge Bronx armory found it a bit depressing. They felt cramped as they walked through the crowded aisles and toiled up the stairs to the parts displays on the balcony where low hanging beams threaten fractured skulls. Then they cursed, more or less softly, as they drilled through biting cold down a dirty, paper strewn alley to the armory where the exhibits overflow from the Coliseum. It does seem as though something might be done about that alley.

Chicago is entitled to a better setting for its show if

one is to be found. New York was pretty well satisfied with the Grand Central Palace until the experiment of going up to the Bronx armory was tried. A single year has sufficed to make it certain that the old site never again would satisfy either the public or exhibitors.

Sam Miles, veteran show manager, has done the best he could in the way of decorations and stage settings, but in comparison with the Bronx armory, the Coliseum looks like the Hicksville opera house set up on the stage of the Metropolitan in New York. Both will serve for exhibition purposes, but there the similarity ends.

Chicagoans say, off-hand, that no place better than the Coliseum is available, but a search for a suitable building should be made even though it may be far removed from the center of the city.

#### Few Factory Men in Evidence

Distributors, dealers and factory representatives were slow in arriving. Only the van-guard came in Saturday, and the hotel headquarters and lobbies were virtually deserted in the evening. Most of the factory men who had arrived admitted they hadn't been out to see the show. It was disappointing, just as it was in New York, that factory representatives at the different displays were about as numerous as the proverbial hen's teeth.

This is a condition which should be remedied if the New York and Chicago shows are to continue as national expositions. Some one, factory trained and with a knowledge of factory conditions, should be on hand to answer the questions of dealers. Theoretically, these shows are more for the benefit of retail sales organizations than they are for the public, but the dealer who goes to either show is left to shift for himself. He gets neither sympathy nor enlightenment from local salesmen who are interested chiefly in their own commissions.

It cannot be denied that there is a growing feeling on the part of factory executives that from the manufacturer's point of view the New York and Chicago shows are not worth what they cost. Just as many sales would be made if they were held under the auspices of the local trade associations and there are a good many who contend that dealer expositions would provoke just as much general interest in automobiles.

One suggestion which has been made is that dealer conferences at which manufacturers could display new wares exclusively to their sales organizations, be held in New York, Chicago and San Francisco once or twice a year. These conferences would be real conventions of the industry and could be devoted entirely to business.

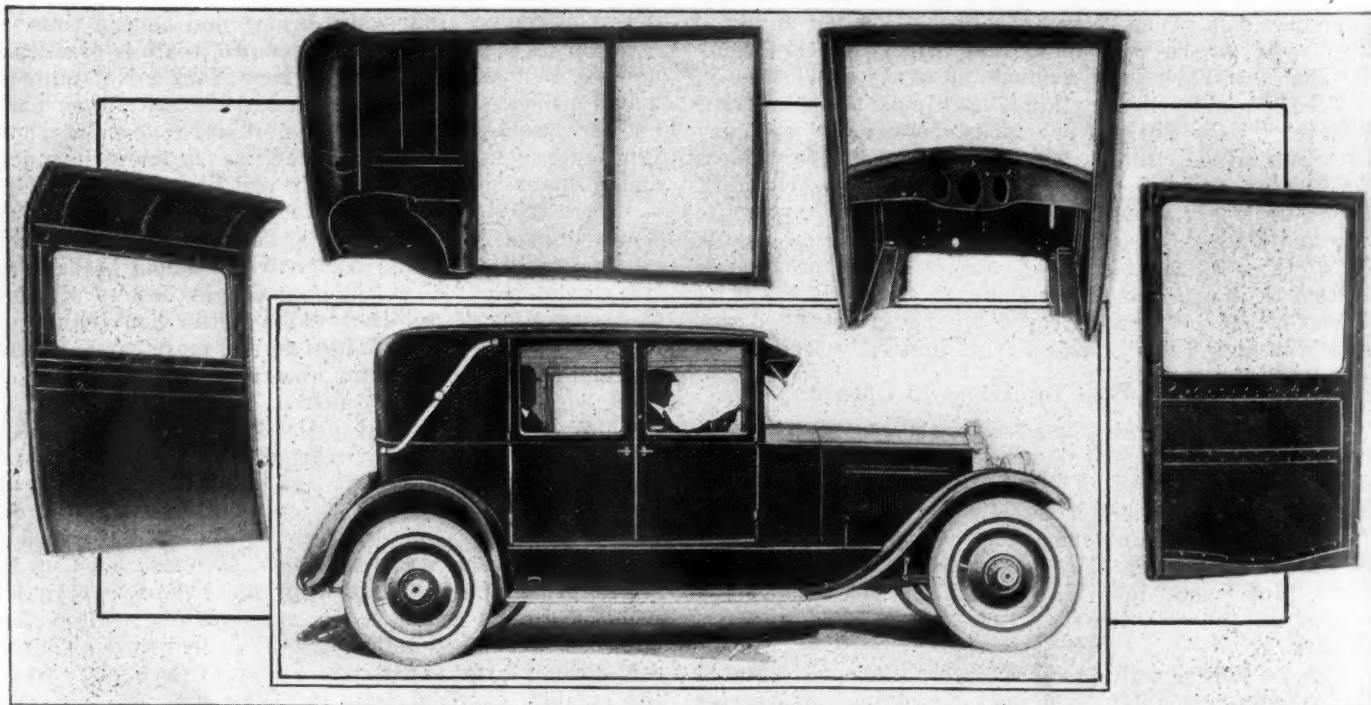
Factory sales managers are virtually a unit in asserting that it is virtually impossible to sign up new dealers either at the New York or Chicago shows. Dealers attend them in large numbers and they absorb much information about their own and competing lines, but they are too busy to make final decisions about swapping contracts. This condition prevails notwithstanding the fact that the atmosphere of the shows is much more sane and business-like than it was even a very few years ago. "Wild parties" have become little more than a memory.

It is reasonably safe to predict, however, that the national shows never will be abandoned until something is found to take their place. All elements of the industry are convinced that there must be some means of getting together once a year manufacturers, jobbers, distributors and dealers. But the sentiment is unmistakable that more actual business has been done at shows which were held exclusively for dealers. This, of course, is very strong among parts and accessory manufacturers. A good many of them dropped out of the national shows this year and more will be missing in 1925. The sales they make are so small as to be negligible. They want to display their wares where there will be fewer visitors and more buyers.

#### Many Dealers Present

More dealers will be in Chicago this week than were in New York three weeks ago. They will come, however, just as much for the annual meeting of the National Automobile Dealers Association as for the show itself. The meetings of that organization Tuesday and Wednesday were more largely attended than ever before, and there was no mistaking the fact that these men are determined to do business on a business basis in the coming year.

As a matter of fact it would be possible to compile in Chicago this week a "Who's Who" of the industry. The hotels are jammed and the luckless ones who came late without reservations may have to sleep on billiard tables.



New Pullman all-steel body shown in Chicago during show week



"Old timers" are more numerous than they were in New York and anyone with ears to listen can spend hours hearing reminiscences of the early days of the industry.

All in all it's a big week for Chicago and the industry and it's all hinged around a splendid display of high class motor cars in the same old drab setting.

Everywhere, among manufacturers and dealers, there is the same spirit of serene confidence in the future. Few believe business will be better this year, than it was last. They think it may not be quite so good, but they are convinced sales of passenger cars will run well past 3,000,000. Manufacturers are bent on keeping profits up and prices down by intensive sales effort while dealers are determined to return larger profits for themselves than they did in 1923.

The used car problem is the one most discussed on both sides of the fence. The new models are so good and offer such splendid values that almost every owner will want one of them. This will mean an insistent demand for trading allowances. A good many dealers are beginning to wonder what will happen when they try to sell cars two or three years old taken as part payment on 1924 models equipped with four wheel brakes and balloon tires. The question is just as important for manufacturers because if the used cars won't sell the new ones can't move.

The only new line shown in Chicago was the Sterling which was displayed at the Auditorium Hotel. There are two bodies, a five-passenger touring listed at \$1,985 and a five-passenger sedan listed at \$2,800. The touring car is in Midnight blue and the sedan Brewster green and black above the belt line, with a pearl gray stripe.

The engine is a Knight type of Sterling design,  $3\frac{1}{4}$  in. bore and  $4\frac{5}{8}$  in. stroke. This engine is claimed to develop 57.5 hp. at 2400 r.p.m. with 4.25 to 1 compression ratio. One of the features claimed for the engine is the light weight of the cast iron pistons. These are said to weight  $23\frac{1}{4}$  oz. with the rings included. They are  $3\frac{7}{8}$  in. long. The crankshaft is a seven bearing type, pressure lubricated. The clutch is also of Sterling design. The drive is taken through two fabric universals and a hollow propeller shaft to a Timken rear axle.

#### Sterling Shows New Line

The electrical equipment is Westinghouse, carburetor Stromberg, and the gearset is a Fuller. The rear axle ratio is 4.66 to 1 on the open cars and 5.1 to 1 on the closed. Rubber shock insulators are used in place of shackles on all springs. The car is mounted on 125 in. wheel-base. The full line includes:

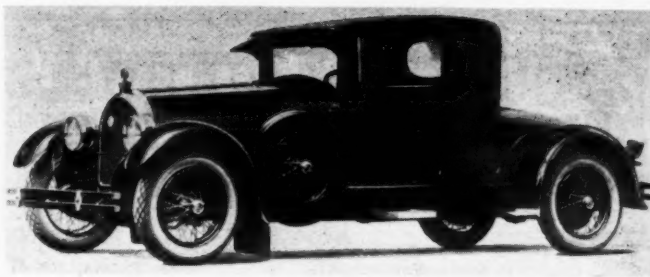
Four-passenger sport.....	\$2,200
Five-passenger phaeton .....	1,985
Five-passenger sedan.....	2,800
Four-passenger brougham .....	2,750

Jordan has announced that four-wheel brakes are standard, instead of optional equipment on all models. Prices have been increased \$100 on all models except the 5 and 7 passenger sedans.

Neither at the show nor at the hotels were there any other car exhibits which were not displayed at New York, except an enclosed Kissel roadster model mounted on a stock Kissel chassis. As a matter of fact, some manufacturers were unable to display, because of lack of space, all the models they had at New York.

A counter attraction for persons interested only in high priced jobs was the Salon which was held at the Drake hotel. There are fewer exhibits than last year but interest seems to be just as keen.

Cunningham, Mercedes, Minerva, Rolls-Royce and Stevens-Duryea made up the exhibits by car manufacturers while exhibits by coachmakers included Isotta-



Kissel enclosed speedster

Fraschini, Lincoln, Locomobile and Packard with colorful displays. There are special coachwork exhibits by Cunningham, Dietrich, Fleetwood, Graff, Pullman and Merrimac. A special steel body by Pullman featured the Pullman display.

## Criticism Invited on Proposed Bolt and Nut Standards

A TENTATIVE report on proposed standard sizes of wrench head bolts and nuts has been submitted to the sponsor bodies, the S. A. E. and the A. S. M. E., by the Sectional Committee on Bolt, Nut and Rivet Proportions, and the sponsor bodies have published a pamphlet containing the proposals, in order that the sub-committee which is working on the subject may have the advantage of the criticism and comments of all interested manufacturers and users before it drafts its final report.

The sub-committee found a large number of standards in use in different parts of the country and wide variations in practice by both makers and users. In formulating the proposed standard, the work of foreign standardization committees was considered, but no attempt was made to harmonize American with foreign practice. What the sub-committee did was to analyze existing practice in this country and attempt to work out tables of dimensions which would be acceptable to the various industries and cause the least possible disturbance to present practice.

Through the unification of the outside dimensions of bolts and nuts it is hoped to reduce the number of wrench sizes required, as well as the number of sizes of raw material which the bolt and nut manufacturers must carry in stock. It was found necessary to depart slightly from sizes calculated by means of the formulae, but this same practice was followed also in the S. A. E., and many foreign standards.

The sub-committee proposes for discussion and criticism the adoption and use by all industries of a single standard nut and bolt head. In connection with nuts it is proposed that the heavy nut sizes of  $\frac{5}{8}$  in. and below be eliminated and only the light nut sizes be used.

Those who are specially interested in the subject are advised to write to C. B. LePage, 29 West Thirty-ninth Street, New York City, for a copy of the pamphlet on Proposed Standard Sizes of Wrench Head Bolts and Nuts.

A GERMAN inventor has taken out a British patent on a new form of combustion chamber designed to produce a high degree of turbulence. A single poppet valve is shown located centrally in the cylinder head, forming the bottom of a dishpan shaped compression chamber. The piston head is chamfered off around its circumference and concaved at the center. Turbulence is produced by the chamfered surface coming up close to a corresponding surface in the cylinder head.

# AUTOMOTIVE INDUSTRIES

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## Passenger Car Track May Be Widened

GENERAL adoption of balloon tires is being delayed partly because a standard set of dimensions which is known to be entirely satisfactory is lacking, partly because large quantity production facilities have not yet been prepared and partly because changes in design of certain parts of the chassis or body are desirable, in general, to enable balloon tires to be used to best advantage.

To get sufficient side clearance it will be necessary in some cases to alter the chassis, either by narrowing the frame, which would be difficult or inexpedient in many cases, or by increasing the track of the car. A 56-in. track has been standard for many years and there has been great resistance to change, without any entirely convincing reason why a change should not come about if it is desirable from a design and production standpoint.

This, evidently, is the view of one car manufacturer who, in order to better accommodate balloon tires, has increased the track of the chassis he builds to 57 in. Others are understood to be contemplating a similar change. Furthermore, trucks of many makes have long since had a track of more than 56 in. In fact, trucks as high as 75 in. are used.

There are, perhaps, occasional conditions in which a track of more than 56 in. will prove a disadvantage, but the advantages which a slightly wider track gives in some instances might more than offset the disadvantages.

A sacrifice of seating width and an increased turning radius will be entailed on most cars using the larger sizes of balloon tires if a wider track is not employed, but it is probable that many if not most of the smaller cars can retain a 56-in. track and still have sufficient clearance for balloon tire equipment.

Axle makers may meet some difficulty in accommodating their production facilities to longer axles, but beyond this no cause for serious trouble seems to exist if a wider track is decided upon.

## Discovered! A Nefarious Plot

THE National Motorists Association has scored a "beat" on all competitors by the discovery that "there is a movement on foot just now to advocate a special levy on motor vehicles to take care of ALL road maintenance." This nefarious plot is alleged to be the result of "a growing tendency to those who have special interests at stake to consider rail and highway transportation as one subject with a view to making the motorist shoulder some of the excessive burdens imposed upon the railroads and other common carriers."

Naturally, says a bulletin of the N. M. A., the motorist is not likely to suspect that "a special road maintenance tax handed to him on a gold platter may mean that he would eventually shoulder more of the taxes which should be paid by the railroads or other classes of taxpayers."

Naturally not, for this talk of a "special road maintenance tax" is based either upon profound ignorance or a wilful determination to mislead. Certainly no one has advocated any such tax, not even "other classes of taxpayers." The automotive industry merely has agreed upon the principle that the users of the highways should maintain them in as good condition as they were when they were built by using for that purpose the fees now being paid by motorists, which are more than ample.

A not unnatural deduction would be that the National Motorists Association is trying to convince the motor car owners of the country that it is serving their interests better than any other national organization of a similar nature, such as the A. A. A. We have no especial quarrel with its desire to increase its membership, but we do feel it should at least approximate the facts in its literature.

The automotive industry, unfortunately, lacks any medium through which to keep all motor vehicle users informed closely of what it is doing for their benefit. This could be done by merely stating the facts and it would not partake of the nature of propaganda. Makers and sellers of motor vehicles of all kinds naturally are seeking rapid extension of the good roads system as a means of expanding their potential markets, but the users of the vehicles will benefit to an even greater degree. There is a mutuality of interest which cannot be denied.



Permanent success never was achieved by fostering selfishness. That is why the "blocs" with which Congress is infested cannot cure the ills of the interests they seek to serve. No group can be successful permanently at the expense of any other group.

The admitted ills of motor vehicle taxation will not be cured until they are approached in a spirit of fairness and mutual understanding. Happily, the automotive industry has approached them in this spirit and the time will come when all the motorists of the country will understand this fact, as a substantial majority of them do already.

## Why Business Will Continue Good

**S**IGNIFICANT of the sanity with which business is entering the new year is the fact that railroad freight car loadings are somewhat less than they were twelve months ago, although well above the level of the same period in 1922. But with loadings of 703,269 for the week ended Jan. 5, which included three days of the holiday period, it is evident that there is nothing to worry about in the present situation.

Industrial conditions improved in the fall of 1922, and the improvement became more pronounced in the early months of 1923. Before the first quarter ended the demand for labor exceeded the supply, wages and prices began to move upward until the symptoms of a boom were recognized. The general up-rush of wages and prices caused a reaction of sentiment and inflation was checked before it was too late.

Happily, no inflationary tendencies are apparent at present. On the other hand, there is a feeling of quiet confidence that industry will continue through the winter at a reasonably high level, with steady improvement as spring approaches.

George E. Roberts of the National City Bank of New York, whose forecasts have proven more accurate in the past two years than those of almost any other economist, asserts that so long as the country is conservative and inflationary tendencies can be held in check, we may look for steady business. "No business crisis ever has occurred," he says, "unless preceded by a marked expansion of credit, and none need be looked for until such an expansion has occurred."

Mr. Roberts believes the greatest achievement of last year was the demonstration that the United States can enjoy so large a degree of prosperity notwithstanding the unsettled conditions in Europe. "The record of 1923 can be repeated," he believes, "if the American people but have the courage to proceed with the development of their resources and the equipment of their industries as they have in the past year."

It is interesting to note that in referring to the record motor vehicle production of last year Mr. Roberts says:

"It is an essential feature of the existing social order that people shall have the privilege of spending their incomes to suit themselves, and we are not prepared to believe that increasing expenditures for automobiles are a symptom of bad times."

The present economic situation is relatively simple.

Business in the automotive industry will be good as long as freight car loadings continue at their present level in what is usually an "off" season. When business becomes good enough to be dangerous it will be reflected by an inordinate expansion of credit.

## Buyers Are Demanding Bargains

**S**TRANGELY enough, not all economists and statisticians think along parallel lines. While some are bewailing the enormous sales of automobiles, many of them on time, others are looking under the surface and finding a reason for this phenomenon. AUTOMOTIVE INDUSTRIES long has contended that the record breaking sales of the past two years have been due largely to the fact that more automobile value could be bought for a dollar than ever before. This view is sustained by the United Business Service, which says:

"The situation to be found today is somewhat of an anomaly in sales experience. While the ultimate consumer has a high purchasing power he is exhibiting an inclination to search for bargains.

"While it is undoubtedly true that the automobile is forcing other industries to move over and give it room, this industry is not entirely responsible for a changed attitude on the part of the public.

"For it is also very true that the buying public has not forgotten the buying fiasco of not so very long ago that led to trouble, any more than business organizations themselves have forgotten that had experience. It is likewise a mistake to compare the buying of today with the wild purchasing abandon that came during the post-war years of release from wartime restrictions.

"The situation today is merely this: The buying public has returned to a more normal mood. It is spending well, although perhaps not always too wisely, for automobiles, but in other ways people are saving as well as spending. And when they spend they look not only for price, but also for value.

"This means that during the months in prospect success will attend the efforts of those retail concerns which recognize this fundamental change in the attitude of their customers. Denouncing the automobile will do little good. Copying from the price plus value plus service leaf of the industry will accomplish much."

## Clean Trade Association

**L**ITTLE alarm need be felt by the automotive industry because of the reiteration by Attorney-General Daugherty that trade associations come into conflict with the Sherman law when they gather and distribute among members statistics of production, distribution, etc.

The automotive trade associations have not violated the spirit of the law and do not intend to do so. The main purpose of the anti-trust statute is to prevent the fixing of prices, and with competitive conditions as keen as they are in all branches of the automotive field, nothing is more unlikely than an attempt to act in concert on the question of price.

# Makers Dispute Couzens' Statement

## Wire Him They Want Excise Tax Repealed

Michigan Senator Had Stated  
That Some Producers Preferred Surtax Removal

WASHINGTON, Jan. 28—Indifference on the part of the automotive industry to the removal of the excise taxes on automobiles, trucks, parts and accessories, as charged by Senator James Couzens of Michigan on Jan. 21, was denied today in a telegram received from seven automobile manufacturers in Detroit. The telegram asked the Senator to work for the repeal of those taxes.

Senator Couzens, while engaged in heated debate with Senator Reed of Missouri, had declared that "the automobile industry preferred to have the surtax reduced rather than the 5 per cent excise tax repealed, because the automobile manufacturer passes the excise tax on to the consumer, while the surtax cannot be passed on to the public."

Such are not the true facts, the automobile manufacturers wired Senator Couzens, and asked that he immediately set the attitude of the automobile industry straight. The telegram follows:

### Telegram Sent Couzens

We understand that on Jan. 21 you made the statement that the automobile industry is not objecting to the excise tax on automobiles. On Jan. 15, representatives of the National Automobile Chamber of Commerce, which comprises practically every company in the automobile industry, appeared before the House Ways and Means Committee and emphatically stated our opposition to the excise tax and requested its elimination.

If Congress is to make a reduction in any excise taxation we ask you, as representing the State of Michigan, to work for the repeal or a similar reduction of the excise tax upon motor cars, trucks and repair parts and to have the record cleared and corrected so far as the attitude of our industry is concerned.

The telegram was signed by Alvan Macauley, president of the Packard Motor Car Co.; Charles Mott, vice-president of the General Motors Corp.; Richard H. Scott, president of the Reo Motor Car Co.; Roy D. Chapin, chairman of the board of directors of the Hudson-Essex Motor Car Co.; H. H. Rice, president of the Cadillac Motor Car Co.; H. M. Jewett, president, Paige-Detroit Motor Car Co., and F. J. Haynes, president of Dodge Brothers.

Defending his position taken on Jan. 21, Senator Couzens has made the following statement to the representative of AUTOMOTIVE INDUSTRIES:

## Business in Brief

NEW YORK, Jan. 28—Very few changes were discernible in business last week. For the most part caution prevailed and it is too early to discover many trends in industrial activity. The most noticeable change was increased activity in the metal trades and movement in petroleum and coal. Bank funds in large volume and low rates of interest are indicative of the hesitancy of business to take chances on the future.

Car loadings for the week ending Jan. 12 aggregated 872,265 cars, an increase of 168,996 cars over the week previous. While this is an encouraging sign it is not necessarily indicative of the future.

Activity in the metal trades is featured by steel. Large buying for structural purposes reveals activity in the building trades, the exact volume and trend of which cannot be determined accurately at this time. Lumber, hardware and paint trades report more activity than a year ago.

The sale of seasonable goods at retail which had been held up by the open weather has now begun to show real signs of life. It is reported that overcoats and fur goods are leading the pace.

Freezing weather without accompanying snow has injured the wheat crop in some States and a severe drought is reported in California. Farmers have been receiving the highest prices of the season for their corn crops. Live stock marketing continues on a higher level than last year.

Stock market activity and rise of well-known stocks showed no signs of any continued climb. Bonds were active and firmer. The continued decline of foreign exchanges and export trade has focused attention on European affairs and brought a closer realization of the importance of the situation as a factor bearing on domestic commerce.

In November I issued a statement to the press in connection with the Mellon tax plan. The gist of it was that I had not given any consideration to the Mellon plan, as proposed, because it did not make any provision for the repeal of the excise taxes on automobiles, trucks, parts, or accessories.

This was given to the daily press in order to give the automobile industry a chance to

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## Unfavorable Report Expected on Repeal

Ways and Means Committee Still  
Calls Automotive Products Luxuries

WASHINGTON, Jan. 30—Efforts of the automobile industry to have repealed the excise taxes on its products will go for naught so far as the House Ways and Means Committee's favorable action is concerned. Politics, characterized by Congressman Robert H. Clancy of Michigan, author of the three repeal measures, as "petty," have engulfed the committee like a cloak and as a result the measures sponsored by the Democrats are largely being thrown into the discard for those favored by the Republicans.

Following many months of hearings, on both the automobile excise taxes and other industrial taxes, Republican members of the committee, numbering fifteen, announced on Monday of this week that there was little likelihood of an agreement and served notice on the Democratic members, numbering eleven, that they would write the majority report, and the Democrats could write the minority report.

### Will Be Fought on Floor

"The question of repeal of the automobile excise taxes can be brought up on the floor of the House, and will be brought up on Feb. 11, when the committee makes its report to that body," Mr. Clancy declared in a statement made today on the prospects of the measure's adoption.

Formal motions, made by various Democratic members of the Ways and Means Committee, to repeal or reduce the excise taxes on automobiles, motor trucks, accessories and spare parts, including tires, were made on Monday, but all of them were defeated.

Tentative agreements, adopted on motions, were passed by the committee reducing various excise taxes to an aggregate of \$103,254,488. An idea of the attitude taken by the committee, in refusing the repeal of the automobile excise taxes, holding that they were luxury taxes, may be gathered from a comparison of those favorably reported, which the committee held were not luxuries.

As an example, the committee held that bowling alleys and billiard tables were not luxuries and favorably reported a reduction of \$1,200,000 in the excise taxes on this industry; the theater admission tax was repealed alto-

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# January Output Placed at 341,000

## Is 15 Per Cent Gain Over December Total

### N. A. C. C. Directors Hear Pro- duction Report and Talk Over Excise Taxes

CHICAGO, Jan. 30—Estimates on January production of cars and trucks based on shipping returns, as reported to the directors of the National Automobile Chamber of Commerce at their monthly meeting held in the Armory here this afternoon, show that the industry has started out at a pace that promises another record breaking year.

With the returns all in except for the last few days, it is estimated that the January figures are 341,000. This is a 15 per cent increase over the December mark and 39 per cent better than January, 1923, when the total was 244,703.

The dominating note of the directors' meeting was the excise taxes and the fight the industry is making to remove them. This brought about the adoption of a resolution reiterating the chamber's stand on excise tax removal and proposing to call on the aid of the N. A. C. C. and every branch of the industry, as well as the 15,000,000 car owners, with a view to showing Congress the unfairness of these taxes.

The speech made in Congress by Senator James Couzens, in which he declared that automobile manufacturers would rather have the surtax removed instead of dropping the excise taxes on automobiles, stirred the directors, and a strong telegram was sent to Senator Couzens. This telegram called attention to the error in his understanding regarding the position of automobile manufacturers on the tax question and asked him to assist in every way to remove the objectionable taxes.

## Fisher Reported Buying Mansfield Steel Plant

DETROIT, Jan. 29—Fisher Body Corp., it is reported, has bought the plant and equipment of the Mansfield Steel Corp., and is understood to be planning the manufacture of commercial bodies and special equipment mainly for the General Motors Truck Corp.

No official statement has been made on the sale of the plant which is subject to confirmation in Federal Court here on Feb. 4.

The sale was made by the Detroit Trust Co. as trustee at a price understood

## Makers Should Aim to Establish Contact at Big Shows with Visitors from Outside Retail District

AN INTERVIEW WITH HARRY M. JEWETT,  
*President of the Paige-Detroit Motor Car Co. and Jewett Motors*

By D. M. McDonald,  
*Detroit Representative of the Class Journal Company*

Detroit, Jan. 30.

ALTHOUGH the outstanding requisite for a successful automobile show is large attendance, no show, no matter how great its attendance, can be regarded as really successful unless there has been a proportionate volume of actual sales made, and the foundation set up for future sales through prospect enrollment.

The situation in the industry with regard to the national shows in New York and Chicago calls for more direct effort on the part of manufacturers to put business across, says Harry M. Jewett, president of the Paige-Detroit Motor Car Co. and Jewett Motors, Inc., and chairman of the show committee of the National Automobile Chamber of Commerce.

In cities like New York and Chicago especially, and in other large cities in which there are many visitors from outside places, manufacturers should arrange to be represented personally at the booths, or have a wholesale representative of their distributor in attendance, to take care of the visitor from outside the retail district.

A considerable part of potential business is probably lost through the inability of the visitor from outside territory to gain the attention he should get at the large city shows. Where only salesmen of the local retail organization are present it is practically certain that the visitor from another city will not be enthused over, as the possibilities of this sale mean nothing to them, although to the factory it means a great deal.

The Paige company, Mr. Jewett said, is making special effort to meet the outside visitor, extend every possible courtesy and so far as possible get him in the frame of mind where he will more than likely consider seriously the possibility of buying a Paige product when he gets back home. It requires no great effort for the factory or wholesale man to get his name so that he may be enrolled as a prospect by the dealer in whose territory he happens to reside.

So far as can be ascertained by expressions of individual manufacturers the last New York show was a better business producer than have been those for several years. Those manufacturers who failed to realize their expectations for business at the show, Mr. Jewett stated, failed to avail themselves of their opportunities either because of cars lacking in appeal or because of poor selling strategy.

The New York show has always been inferior to that held in Chicago and in several other large cities from a retail sales viewpoint, though this year it showed much improvement and probably can be developed much further. There is no particular reason why New York show sales should not match up proportionately with those in any city and should be studied by manufacturers.

There is rarely anything that manufacturers succeed in achieving at dealer show meetings that they haven't been trying to do through correspondence or other means during the year. It apparently remains for the personal meeting with its accompanying enthusiasm to put the idea over. This will continue to be so until all dealers have advanced to a point of development where the printed word will be all that is necessary.

to be \$275,000 following a failure of the confirmation of the piecemeal sale of the plant at auction on Jan. 10. If the sale is confirmed it is understood that the Fisher company will erect a large addition to the present plant and will undertake the manufacture of commercial bodies on a large scale.

This will place the General Motors Truck Corp. in a position to sell all or any of its models fully equipped with bodies and cabs.

## GILL ANNUAL MEETING HELD

CHICAGO, Jan. 30—At the annual meeting of the Gill Manufacturing Co. E. E. Warfield was advanced from the position of sales manager to vice-president in charge of sales, while A. L. Miller will act as assistant general manager in addition to continuing as treasurer. The company reported that January has produced double the orders of the same month a year ago.

## Interest in Service Evident at Chicago

### Used Cars Form Another Question Appealing to Dealers Visiting Show

CHICAGO, Jan. 28—Chicago hotels are packed to the guards tonight with visitors from all parts of the country here for the national show. Motor cars and the automotive industry are the only subjects discussed in lobbies. A large share of the space in the various hostels has been taken as headquarters for the manufacturers of cars and automotive products. They are thronged constantly with dealers.

More distributors and dealers have come to Chicago for the show than went to New York, chiefly because of this city's more central location. They are not deeply interested in the show itself, however. Most of them have come to see sales and service managers and other factory officials. They say they can get better results and more undivided attention by conferring with these men either in New York or Chicago than they can at the factories, because company officials devote their entire time to this subject at the shows.

Steadily increasing interest in the subject of service is apparent among both dealers and factory representatives. Service managers are among the busiest men at the show, and they are on duty constantly at headquarters, giving advice and answering questions. The flat rate system will become practically universal in a short time. Dealers assert that it permits them, for the first time, to make money on service, and that it keeps their customers satisfied.

Sales managers are discussing the used car problem with their dealers, and their factories this year will give greater assistance than ever before in helping solve it. This was the principal topic discussed at the annual meeting of the National Automobile Dealers Association.

## Ford Discredits Report of 18,000 Soviet Order

NEW YORK, Jan. 28—A cable to the New York Times reports that the firm of "Cyclone," which represents the Ford Motor Co. in Denmark, has contracted with the Soviet Government for the importation of Ford motor cars into Russia. All Ford cars sold in Russia, according to the report, are to pass through Copenhagen or be made in Ford's factory in that city.

The contract, the report states, binds the company to deliver 18,000 cars yearly, representing a total of 54,000,000 Danish crowns.

### New York Handles Russian Sales

DETROIT, Jan. 29—Ford Motor Co. here says there is no knowledge of any new negotiations between its Co-

penhagen branch and the Soviet Government. The company has been selling cars and tractors in Russia for several years through the Allied American Corp. of New York, which acts as a distributor for Ford in Russia.

The present negotiations, it declares, are only a continuance of the business relations and, so far as it knows, the contract does not stipulate any fixed number of units to be taken in any year. Units distributed in Russia last year, according to the company, approximated 500 cars and about 300 tractors. Eighteen thousand units, as reported, would indicate a large increase, and the officers here do not take the figure seriously.

Arrangements for distribution of products in Russia have to be made with a Soviet commission and require usually the taking for export of Russian goods of about equal value, the Copenhagen branch being favored in this by reason of a trade agreement between Russia and Denmark.

Shipments to southern Russia, the Ford company offices here declare, are made from New York, the Copenhagen branch supplying the northern section, Latvia, Finland and other northern countries. The principal difficulty in the development of Russian trade is arrangement for payment, the company declares.

## Albaugh-Dover Assets Bought by Syndicate

CHICAGO, Jan. 28—A syndicate composed of former stockholders and bondholders, has bought the entire assets of the Albaugh-Dover Co. The new company, which will be known as the Albaugh-Dover Manufacturing Co., will be capitalized at \$200,000 and will concentrate its activities on the manufacture of separators and the cutting of gears. The incorporators are Peter A. Mortenson, Walter E. Smith and Rose B. Harter.

While the officers have not as yet been selected, the directors in addition to Messrs. Mortenson and Smith and Mrs. Harter are J. N. Appel, E. W. Buck, Thomas J. Morris and Dr. John Goltra. F. G. Eppley, who has been in charge of the manufacturing departments of the old company for seventeen years, will continue in that capacity.

## Kelley Valve Plant Sold to FitzJohn, Body Builder

MUSKEGON, MICH., Jan. 26—FitzJohn Manufacturing Co., builder of bus bodies, has purchased the plant of the Kelley Valve Co. east of Muskegon Heights, and after building an addition, will start manufacturing operations in the new location.

It is expected that the company will occupy its new quarters about March 1 and that it will have a capacity five times greater than was possible in the old factory. The new plant will be used entirely for the production of bus bodies, operations to start on a shipment to the Reo Motor Car Co. at Lansing for mounting on the new Reo bus chassis.

## Percentage of Time Sales Gains Little

### Dealers Intent on Combating Propaganda of Clothiers and Others

CHICAGO, Jan. 28—Dealer organizations in several sections are preparing to take steps to combat the propaganda against the purchase of automobiles on time, which has been instituted by associations of clothing dealers and others who have become alarmed because of the falling off in their own business and are attributing it to enormous sales of motor cars on installments.

The contention of automotive interests is that if other manufacturers and dealers would give the public greater values than prevailed in pre-war days, as motor car makers have done, there would be an immediate sharp upturn in their sales volume.

### Volume of Time Sales Gains

Finance companies operating on a national basis which are obtaining the bulk of the business contend emphatically that there is nothing in the situation which need cause the slightest apprehension. While the volume of time payment sales has increased tremendously because of the larger sales volume, the percentage of the total is little larger than it has been in the past.

Such percentage of increase as has taken place has been due to the fact that many persons well able to pay the full purchase price of a car have decided to pay for it on installments out of income rather than from savings.

National finance companies are examining credit risks even more closely than in the past, and their losses on passenger car business are negligible. These companies have persistently refused to make their credit terms more liberal and are insisting on the completion of the contract in not more than twelve payments. They refuse to take less than one-third down.

### Easy Terms Offered

Ridiculous credit terms, such as eighteen to twenty-four months, are attributed to local companies which accept dealer paper without reserve, and which have granted all kinds of terms to take business away from national concerns which conduct their business along banking lines. There is said to be a strong tendency among dealers to abandon the local companies because of the fear that they might have to shorten their lines sharply if there were a credit stringency.

The national companies are steadily expanding their organizations and soon will have branches in virtually every good-sized town in the country. It is significant that the Commercial Investment Trust has decided to increase its capital from \$9,000,000 to \$13,000,000. Less than six months ago its capital was increased from \$6,000,000 to \$9,000,000.



## Country Organizing for Law Uniformity

### National Organization of State Motor Vehicle Administra- tors Looms Up

NEW YORK, Jan. 26—Definite steps toward a national organization of State motor vehicle administrators, which is expected to be a strong factor in accomplishing national uniformity in motor vehicle regulation, were announced at the Eastern Conference of State Motor Vehicle Administrators held at the Hotel Commodore yesterday.

The Eastern Conference, which is composed of heads of State departments in New York, New Jersey, Pennsylvania, Maryland and all of the New England States, was told of the recent formation of a sectional conference in the Mid-Western States, and of plans for organizing similar conferences in the Southern and Pacific Coast sections.

#### National Conferences in Prospect

When the various sections of the country have been organized, it will then be possible to hold national conferences of delegates representing each of the sectional organizations.

One of the topics that was given considerable attention at yesterday's meeting was laws to curb effectually the driving of motor cars by persons under the influence of intoxicants or narcotics. A general discussion of the laws existing in the member States brought out the fact that revoking of licenses for a long period was more widely effective than jail sentences.

A. E. Stewart, representing the Public Utility Commission of Connecticut, introduced three resolutions which were referred to committees for consideration and action at the next meeting.

The first of these resolutions drew attention to the fact that many trucks are wider than half the roads over which they travel, and that with the present spacing of headlights it is impossible at night to estimate the width of the truck and allow sufficient clearance in passing.

#### Recommendation for Lights

The resolution recommended that the members advocate the passage of State laws requiring trucks to carry one or more standard green lights with 4-inch lenses and four candle-power bulbs on the front extreme left of the truck body. It further provided for a monitor inside the cab to inform the driver at all times whether the light is operating.

Mr. Stewart also recommended that all gasoline service stations be compelled to provide a chain to be used in grounding each car before removing the tank cap to serve gasoline. He pointed out that cars moving along the road store up considerable static electricity which, if not grounded, is liable to cause a spark to jump from the car to the nozzle of the gasoline hose, igniting gas fumes and

causing fires and personal injuries. A chain, properly grounded and touched to the fender or some other part of the car, would "drain" the static electricity and prove an effective safety device, he said.

Another recommendation of Mr. Stewart was the adoption of yellow in all stop, slow or other signaling devices on the rear of automobiles, instead of red, and the elimination of such words as "stop," "slow," etc. Stewart reminded the conference that yellow is the color of light used by all present forms of transportation to designate caution, and suggested that the motor vehicle should be brought within the existing code.

The appointment of a committee to select color combinations for license plates for the various States in the conference, to give particular attention to effective and legible combinations, was approved.

Having attained uniformity in regulations concerning the lighting of motor vehicles in the member States, the conference seeks to obtain cooperation from motor vehicle heads in the Canadian provinces bordering on Maine, New Hampshire, Vermont, New York and Pennsylvania, and has extended an invitation to these men to attend the next meeting of the conference to be held during the third week of April, 1924.

The move was taken after representatives of the border States had discussed the difficulties in enforcing non-glare regulations, due to the large number of cars of Canadian registration on their highways.

#### S. A. E. Recommendations Referred

The recommendations of the Society of Automotive Engineers for a standard license bracket were referred to a committee for consideration and report at the next meeting.

Recommendations of the S. A. E. for a method of aiming and making focal adjustments of headlights and the society's invitation to send a representative to a meeting with the American Engineering Standards Committee and others to outline a special laboratory test for the approval of headlights, were referred to the committee which handles this phase of the organization's activities.

### First Report Is Issued on Crude Rubber Sources

WASHINGTON, Jan. 29—The Department of Commerce has made public its first survey of crude rubber as a result of the investigation undertaken to develop sources of supply for domestic markets which would be free from the foreign monopoly of the present supply. The survey deals only with the marketing of plantation rubber, covering the various sources of supply and the methods employed by dealers and purchasers.

There is no suggestion in this survey for the development of American controlled rubber plantation fields, but it is understood that the department later will outline a program for freeing domestic markets from the foreign monopoly of the sources of supply of the raw material.

## Car Vital Necessity, Says Senate Report

### Radical Restrictions Would Be Serious Step Backward, It Declares

WASHINGTON, Jan. 28—With a preamble declaring that "the automobile is here to stay and has become such a vital part of our daily life, both business and social, that to restrict or hamper its use in a radical way would be to take a serious step backward," the Senate Committee's long-expected traffic report has been submitted to the Senate.

Hearings on the report have been under way for nearly three months. Hundreds of witnesses have been heard; experts on traffic have given testimony; business men have recited their opinions on every phase of the traffic problem affecting their business, and police authorities, making recommendations in the fundamental law, have been given a careful hearing. Summed up, the recommendations, as made by the committee, will mean greater freedom allowed the motorist.

#### No Maximum Speed Limit

Probably one of the most revolutionary theories of traffic regulations is overturned in the committee's recommendation that there should be no maximum speed limit fixed. "In the opinion of your committee," says the report, "there should be no speed limit fixed or attempted to be enforced, but there should be a very rigid enforcement of a 'reckless' driving regulation."

Reckless driving is defined as "driving in such a fashion as to endanger the lives or property of others." A relentless war on such motorists is recommended. Recognition is made in the report, however, "that the automobile is a modern vehicle of transportation," and to throttle it down to 6, 8, 10 and 12 m.p.h. in all places is contrary to good judgment. Six miles an hour, under certain circumstances, is dangerous, while 25 m.p.h., under other circumstances, is safe, the report points out.

#### Saturation Point Not Near

Speaking of the much-discussed subject of the saturation point of automobile sales, the report says: "The number of automobiles is increasing rapidly each year, and while efforts are being made to predict when the saturation point will be reached, no one can predict it with any certainty, and it is probably not to come in the very near future."

The recommendations, made by the committee, are to be incorporated into a model traffic law. A digest of the report follows:

Anyone but a normal adult should be prohibited from operating a motor car. Automobiles weighing a ton, capable of high speed can logically be viewed as a dangerous weapon when placed in wrong hands.

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## Men of the Industry and What They Are Doing

### Snow Chief Engineer for Velie

Herbert C. Snow has been appointed chief engineer of the Velie Motors Corp. He has been identified with the automobile industry as designer and engineer for more than eighteen years and has had a broad experience in all phases of automobile designing and engineering. Originally with the Garford Motor Truck Co., Mr. Snow has since been identified with the Peerless Motor Car Co., Willys-Overland Co. and the Winton Co. The appointment is also announced of H. W. Farrow as general superintendent of the Velie engine factory at Marion, Ind.

### L. A. Raasch Made Sales Manager

Lou A. Raasch has been appointed sales manager with headquarters at Worcester, Mass., of Walden-Worcester, Inc. Mr. Raasch has been manager of the company's office at San Francisco since 1919. The appointment involves no change in the present policy of distribution.

### Loveland Named Service Manager

I. E. Loveland, formerly service engineer of the Remy Electric Co., has been named service manager of the company, to succeed R. K. Evans. Mr. Evans has joined the staff of the General Motors Export Co. at New York City and later will be assigned to duties in its foreign field.

### W. E. Phelps Resigns

William Elliott Phelps has resigned as sales manager of the Roamer Motor Car Co. after an association with the company covering the last eighteen months. Mr. Phelps was previously connected with the Haynes Automobile Co.

### Roberts Goes to Kansas City

Walter H. Roberts, former sales manager of the Willys-Light division of the Electric Auto-Lite Corp. of Toledo, is now manager of the Kansas City branch of Willys-Overland, Inc. He has been sales manager both with the Willys-Light and the Toledo Scale Co. Before going to Kansas City, Mr. Roberts spent practically his entire life in Toledo.

### Logie Sales Head in Canada

L. Logie, who has had many years' experience in the automobile business, has been appointed Canadian sales manager for the Rickenbacker and Rollin cars, with headquarters in Windsor, Ont.

### Mansfield in Consultant Work

J. B. Mansfield, formerly president and general manager of the Mansfield Steel Corp. and Detroit Trailer Co., has opened consulting engineering offices at 5005 Cass Avenue, Detroit, specializing in sales, transportation, shop management and other features of industrial work.

### OLD TIMERS REELECT HARRY BRANSTETTER

CHICAGO, Jan. 30—Harry P. Branstetter of Chicago was re-elected president of the Old Timers' Club at the annual banquet of the organization at the Congress Hotel last night. All other officers also were retained.

The banquet, as usual, was a get-together of veterans of the industry who avail themselves of this occasion to renew old acquaintance and enjoy a good cabaret.

Mr. Mansfield went to Detroit fourteen years ago and was largely instrumental in the development of the companies of which he later became president. For several years he has specialized in trailer, steel body, hoist and frame work for commercial vehicles.

### H. B. Osgood Resigns

H. B. Osgood, for the last four years general manager of the Giant Grip Manufacturing Co., Oshkosh, Wis., manufacturing traction equipment for motor trucks and buses, hardware specialties, etc., has resigned, effective March 1. He has not completed future plans, and his successor has not yet been selected. Mr. Osgood recently completed his second term as president of the Oshkosh Association of Commerce.

### Aguirre in New Connection

J. V. Aguirre, for the last five years export manager of the Mason Tire & Rubber Co., has resigned to join the Rubber Manufacturers Export Association of Akron as vice-president. Mr. Aguirre will sail from New York on Feb. 16 and will make an extended trip through the West Indies, Colombia and Venezuela, establishing connections for the manufacturer members of the association.

### National Motors Officers Say Suit Is Friendly One

INDIANAPOLIS, Jan. 29—Officials of the National Motors Corp. say, in commenting on the appointment of receivers in the United States District Court in Cincinnati, that the action is a friendly suit in the efforts to reorganize and re-finance the corporation.

The action was brought by the Union Trust Co., Cincinnati, and H. A. Wheeler of Chicago, trustees, in the interests of security holders of the merger. The court authorized the receivers, Rolland A. Crandall of Chicago and H. J. Linkert of Dayton, Ohio, to continue the business pending further court orders.

### Dealer Association Elects Butler Head

Minimum of 5 Per Cent Profit for  
Year Is Keynote of N. A.

### D. A. Convention

CHICAGO, Jan. 31—Automobile dealers from the Middle West, South and all States west of the Mississippi are attending the annual convention of the National Automobile Dealers' Association, which opened a two-day session yesterday morning. It is the largest meeting in the history of the organization.

A minimum of 5 per cent net profit for this year is the keynote around which the program has been built and it is evident the dealers are steadfast in their determination to earn at least that much. Factory representatives at the meeting indicated they will do everything they can to help them.

John Butler, Dodge Brothers distributor in Kansas City, was elected president to succeed G. G. G. Peckham of Cleveland. C. E. Gambill, president of the Gambill Motor Car Co. of Chicago, was promoted from second to first vice-president and his place as second was filled by Charles Warren of the Warren Nash Co. of New York. F. W. A. Vesper of St. Louis was reelected treasurer and C. A. Vane secretary and general manager.

### Problems of Industry Taken Up

The first day's program was devoted to a consideration of the big general problem of the industry. J. H. Collins, manager of the commercial survey department of the Chilton company, described the changes which have taken place in recent years in the car dealers' business.

Mr. Collins declared that the dealer who survives in the next year or two will be the one who is not simply a car dealer, but an automotive merchant and who realizes that every division of an increasingly diversified business must stand on its own feet and show its own profit. When a dealer fails to get a profit out of each item of his business he is either inefficient in operation or offering a subsidy to get trade, Mr. Collins said.

The more intimate aspects of manufacturer-dealer relationships were touched upon by John A. Nichols, Jr., sales manager for Dodge Brothers.

Practically all of today's sessions were devoted to a discussion of various methods which have been evolved for making the used car problem less serious and putting sales in this department on a business basis.



## Willys Enlists Aid for Motor Congress

Meets Representatives of Foreign  
Countries at Dinner in  
Washington

WASHINGTON, Jan. 29—The purpose of the World Motor Transport Congress, to be held in Detroit, May 21 to 24, was outlined today to representatives of thirty-one countries, who attended a dinner of the Foreign Trade Committee of the National Automobile Chamber of Commerce at the Metropolitan Club.

John N. Willys, chairman of the committee, acted as toastmaster and spokesman for the automobile industry, which is acting as sponsor for the congress. He spoke briefly on what the automobile industry has done for the United States, and explained that the purpose of the dinner was to acquaint, first hand, the representatives in the United States of the foreign countries that are expected to send delegates to the congress.

### Industry Sponsors Project

"The automobile industry has made a decided step forward in calling together this congress," Mr. Willys said. "It is the first industry to sponsor such a project and has done so to create, through co-operative helpfulness of all countries, a better appreciation of the economic progress contributed by the motor vehicle; and to provide international understanding of factors on which depends the achievement of a motorized world with its resultant benefits to mankind.

"The automobile has done more for this country than any other agency. It has brought happiness and health to millions; it has increased the value of land; its use depends on good roads to a large extent, and it is through the demands of the motor-riding public that good roads have been built in this country."

In outlining the part that the automobile has played in the development of the United States, Mr. Willys declared that the reason the automobile has prospered to such an enormous extent was twofold: (1) Because of a good product, and (2) a low and reasonable price.

### Get Purposes First Hand

After outlining the purpose of the congress, he told his audience that they had been invited to the dinner for the specific purpose of having explained to them the project, "in order that you may in turn explain it to your government."

"The automobile industry appeals to you to appeal to your government to send the right kind of delegates to this congress," Mr. Willys said. "They should consist of dealers, editors, bankers and officials of your respective governments, concerned with motor transport. We want to reach the right kind of delegates and ask that you help us in this particular phase."

## CITROEN ENGINEERS HERE TO MAKE STUDY

NEW YORK, Jan. 30—Ten automobile engineers representing Citroen arrived here yesterday on the French liner Savoie from Havre to study the automobile manufacturing field and to make such industrial surveys as are essential before actual construction and building operations are started on the proposed Citroen factory in this country.

Several months ago M. Citroen came to America to investigate the fertility of the manufacturing field with a view to developing his output in this country. When he sailed he stated that he expected to return in 1924 when the time would be more auspicious for financing the enterprise.

Those in attendance representing the N. A. C. C. included, in addition to Mr. Willys, George F. Bauer, secretary of the Foreign Trade Committee; Pyke Johnson, Washington representative of the N. A. C. C.; N. C. Damon of the Washington office, and a member of the Dodge Brothers and a member of the Foreign Trade Committee.

The Department of Commerce was represented by J. Walter Drake, Dr. Julius Klein, M. H. Hoepf, Thomas R. Taylor, E. S. Gregg; the Department of State by Addison C. Southard, C. Rice Butler, Stanley K. Hornbeck, Edwin C. Wilson, and the Pan-American Union by Dr. L. S. Rowe.

The foreign countries represented at the dinner were the following:

Belgium, Brazil, Bulgaria, Chile, China, Colombia, Cuba, Ecuador, Egypt, France, Germany, Haiti, Honduras, Italy, Japan, Jugoslavia, Netherlands, Norway, Panama, Persia, Peru, Poland, Portugal, Salvador, Siam, Spain, Sweden, Switzerland, United Kingdom, Uruguay and Venezuela.

## Higher Prices of Trucks Announced by Bethlehem

ALLENTOWN, PA., Jan. 30—The Bethlehem Motors Corp., manufacturer of the Bethlehem truck, announces an increase of \$210 on its regular 1-ton chassis and an increase of \$310 on its 2-ton and 3-ton chassis. The following table gives the old and new prices:

	Old Price	New Price
Airline Model KN.....	\$1,385	\$1,595
Fast Freight Model GN.	2,185	2,495
Heavy Duty Model HN..	2,925	3,295

### BALLOON TIRE PRICE CUT

AKRON, Jan. 31—Firestone Tire & Rubber Co. has announced a 20 per cent reduction in the price of balloon tires, made possible, it is said, through the lowering of production costs. Other companies are expected to meet the Firestone cut.

## Crankshaft Company Votes to Liquidate

Automobile Crankshaft Corp. Has  
Been Producing for Smaller  
Concerns

DETROIT, Jan. 30—Directors of the Automobile Crankshaft Corp. voted yesterday to liquidate the company. This action will be proceeded with immediately, the plant and equipment now being offered for sale in part or complete.

The company is capitalized at \$500,000 of which \$350,000 is paid in. There are 9500 shares of no par value common and 1982 shares of preferred stock redeemable at 120.

In voting to liquidate, the directors of the company were influenced by changed conditions in the industry. During its existence the company has specialized in machining and in grinding of crankshafts for smaller producing car and engine makers. Gradual reductions in this field made it inadvisable to continue and the company did not wish to change over to crankshaft work for large producing companies because of competitive conditions.

The work of liquidating will take close to six months. Proceeds will be applied to debts and to the payment of preferred stockholders at par and the balance will be divided pro rata among common stockholders. The company will not be sold as a going concern, although there are still a considerable number of accounts on which the company is working. Work for these will be concluded in the course of liquidation.

## Battery Makers to Form Organization in March

CHICAGO, Jan. 29—As a result of a preliminary meeting of four representative battery manufacturers in Chicago today, it was decided to call a general meeting of all responsible storage battery makers on Friday, March 21, in this city, for the purpose of organizing a battery manufacturers' association.

The meeting will be largely informal, no by-laws having been adopted. The objects of the organization will be to promote a better understanding among battery makers and endeavor to elevate car owner publicity on the better care of batteries.

Invitations to the meeting will be sent in a short time by a preliminary organization committee consisting of D. H. Kelly of the U. S. Light & Heat Corp., Niagara Falls; R. B. Crane of the Cooper Corp., Cincinnati; Charles A. Englert of the Englert Manufacturing Co., Pittsburgh, and A. R. Campbell of the Wright Battery Co., Flint, Mich.

Mr. Kelly is chairman of this committee, and Mr. Crane will make arrangements for the organization meeting in March.

## Truck Makers Active Meeting Bus Demand

### Orders for Parts Reflect General Improvement in Their Branch of Industry

MILWAUKEE, Jan. 28—Under a quiet surface covering the local automotive units and equipment industry since Jan. 1, it develops that there has been very substantial activity along lines of sustaining production at or above the average for December, with February schedules projected at an advance, and prospects for March output, judging by shipping instructions, to be even better.

Motor car manufacturers, since the second week in January, have been calling for units, parts and equipment in a volume comparable to the best months of 1923. As the month comes to a close, specifications reveal a stepping-up process in line with the broader production and shipping schedules the various factories have laid out for February.

While makers of engines and other important units, as well as the lesser parts and general equipment for passenger cars, are being called upon for at least as much material as ever before, there is particular pleasure in viewing the improvement in the motor truck industry. This refers at present more particularly to the motor bus field.

There appears to be a heavy demand for motor bus chassis and bodies, which the truck factories are attempting to fill at the same time that they are experiencing a gradual betterment in the call for commercial vehicles for freight transportation. The truck factories as a rule are not in a position of strained capacity as yet, but it looks as if expansion is not far off, in view of the growth of the motor bus.

### Industrial Tractors Improve

Evidence is coming to hand that tractor business is showing signs of improvement, although from the agricultural standpoint the demand is still very small. Industrially, however, the tractor seems to be earning more and more recognition as an instrument with a wide variety of purposes and uses which make it more desirable than ordinary hauling devices costing as much or more.

An example is found in the good demand for tractors with fixed or interchangeable crawler traction for hauling, hoisting, excavating, etc., by the adaptation of multi-purpose equipment which makes the type far more useful than the accepted standard machine capable only of hauling a load. Tractor builders view the industrial field with a great deal more interest than the purely agricultural field.

### FRENCH-GERMAN TAX

PARIS, Jan. 21 (by mail)—Claiming that French automobiles entering the oc-

cupied regions of Germany have an advantage of being exonerated from the 20 per cent luxury tax, the Union of the Automobile Industry of the Reich asks for the same treatment for German-produced cars. It is maintained that the luxury tax makes it impossible to compete with foreign cars.

## Chicago Makers Stopped from Using Bosch Name

CHICAGO, Jan. 29—Permanent injunctions have been issued to the American Bosch Magneto Corp. by the United States District Court, Northern District of Illinois, and the Illinois State Court, restraining M. K. Schachter and Isidor Schachter, operating in Chicago under the name of "Bosch Ignition Corp." from using the name of "Bosch."

The Ignition corporation manufactured and sold an attachment for ignition apparatus on automobiles which it called the "Bosch High Tension Transformer" and in its circular describing this attachment is said to have displayed prominently the name "Bosch." The injunctions apply to the Ignition corporation, its officers and all its agents.

Contempt proceedings have been started in the Illinois Court against the sale of any of the transformers bearing the name "Bosch" that may be held in stock since the injunctions were granted.

## "Cannonball" Baker Heads Cushion Pad Company

INDIANAPOLIS, Jan. 30—"Cannonball" Erwin G. Baker, road and stunt driver, heads the Cannonball Baker Co. of Indianapolis, Inc., which will manufacture cushion pads for automobiles and office chairs. Paul G. McCampbell is secretary-treasurer, and Oren M. Ragsdale is manager with Burt Talbott as another member of the directorate.

"Cannonball" Baker invented the cushions that will be manufactured when he was racing motorcycles across the country. He later developed them for the automobile, and now has further refined them for production. They will be made of uncured sponge rubber, from 3 to 5 in. thick.

## Coats Steam Car Plant to Be Auctioned Again

COLUMBUS, OHIO, Jan. 30—John G. Price, receiver for the Coats Steam Car Co., which has discontinued business at the Columbus plant, has been authorized by the bankruptcy court to offer the property at public auction, Feb. 29, at 10 a. m. at the plant.

The real estate is appraised at \$278,000 and the machinery at about \$20,000. At the first offering for the sale the highest bid was \$107,000, which the court refused to accept. The plant consists of 7½ acres of land with three buildings, one of which is a large modern factory building. In addition, there is a dry kiln for lumber and a power house with two boilers.

## Pointers on Economy Given by Rutherford

### Tells Rubber Association Members How They Can Save \$30,000,000 a Year

AKRON, Jan. 29—W. O. Rutherford, vice-president and sales director of the B. F. Goodrich Co. and president of the Rubber Association of America, has published for circulation among association members a pamphlet in which he outlines possible savings in the rubber industry amounting to \$30,000,000 a year.

Some of the suggestions made in the Rutherford publication already have been partially put into effect by some of the larger rubber companies while others are continuations of policies already initiated by the industry.

The industry expends more than \$10,000,000 annually in settlement of adjustment claims. At the present time it guarantees workmanship and materials in tires for the length of the casings. Rutherford suggests that this guarantee be limited to the time of delivery. This suggestion follows abrogation of mileage guarantees by the rubber industry two years ago.

More than \$5,000,000 annually could be saved by establishment of shipping centers to which the rubber manufacturers would ship tires in carload lots to be distributed in less than carload lots. The consumer would pay the freight on the shipments from the shipping centers to destination.

The industry could save another \$5,000,000 a year by reduction of the number of branches in operation and by removal of existing branches from retail to wholesale districts. This suggestion is in line with the shifting of branch locations which has been under way since early 1921.

### Cut in Sales Force Recommended

The industry could save another \$5,000,000 by reduction in sales forces and calling upon the trade less frequently. At present, Rutherford states, the trade is called upon too frequently. The number of calls should be reduced so that the dealer would have more time to sell goods and at the same time he should be encouraged to buy in large volume.

Because advertising does not expand the market for tires, Rutherford suggests that this could be materially reduced and at least another \$5,000,000 a year saved. Reductions in this line are possible because of the low price of tires at the present time and the elimination of retail prices on the part of manufacturers of tires.

### FRANKLIN MAKING 56 DAILY

SYRACUSE, N. Y., Jan. 28—Franklin Automobile Co. reports that it has reached a daily production of fifty-six cars, which is the full plant capacity.



# U. S. Nearly Doubled Overseas Shipments

Cars and Trucks Shipped in 1923  
Were 152,098 as Against  
78,559 in 1922

WASHINGTON, Jan. 29—Exports of automobiles and motor trucks from the United States for the twelve months ending Dec. 31, 1923, nearly doubled shipments for the previous year, according to figures of the Department of Commerce.

For 1923 the Department reports that exports of cars and trucks totaled 152,098, of a value of \$106,296,437, compared with 78,559, valued at \$59,770,791 for the year 1922.

During 1923, as shown in the accompanying table, 127,035 cars were exported, with a value of \$90,692,272, contrasted to 66,791 valued at \$51,049,816 in the year previous. Trucks increased from 11,443 (\$4,270,708) in 1922 to 24,861 (\$15,318,058) in 1923.

These figures, of course, do not include Canadian exports or the shipments from Ford's foreign branches.

Exports of both cars and trucks in December declined from November with 12,152 cars shipped abroad last month as against 13,814 in the month previous and 2066 trucks in December as compared with 2920 in November.

## Shipments from Canada

MONTREAL, QUE., Jan. 28—Figures issued by the Canadian Government show that during the year 1923 12,439 motor trucks, valued at \$4,503,000, were ex-

ported, as compared with 2564, valued at \$1,094,000, in 1922. In the same period 57,481 automobiles, valued at \$29,325,000, were exported, as against 35,394, valued at \$21,059,000 in the year previous.

Canada's best truck customer was the United Kingdom, taking 499. Australia followed with 489, and New Zealand stood third with 252 to its credit.

New Zealand was the heaviest automobile purchaser, taking 1846 during the year as compared with Australia's 1457 and the United Kingdom's total of 807.

Automobile parts exported during the year were valued at \$3,530,000, compared with \$1,926,000 in 1922.

## FORD'S CANADIAN PLANS

DETROIT, Jan. 29—Ford Motor Co. of Canada plans an output of 125,000 cars this year, or an increase of 56 per cent above 1923. Of last year's output 50 per cent was sold in Canada and the remainder shipped to other British dominions.

## Exports, Imports and Reimports of the Automotive Industry for December, 1923, and Total for Twelve Months Ending December 31

	EXPORTS				Twelve months ending December 31			
	Month of December		1923		1922		1923	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis.....	8,560	\$5,703,046	12,152	\$9,312,113	78,559	\$59,770,791	152,098	\$106,296,437
Electric trucks and passenger cars.....	49	62,678	17	14,901	325	450,267	202	286,107
Motor trucks and buses, except electric:								
Up to 1 ton.....	1,522	503,805	1,498	635,252	8,290	3,266,927	19,561	7,325,177
Over 1 and up to 2 1/2 tons.....	197	245,391	365	531,746	2,450	3,076,811	4,206	5,233,203
Over 2 1/2 tons.....	52	113,182	203	543,211	703	1,926,970	1,094	2,759,678
Total motor trucks and buses except electric.....	1,771	862,378	2,066	1,710,209	11,443	8,270,708	24,861	15,318,058
PASSENGER CARS								
Passenger cars except electric:								
Value up to \$500 inclusive.....	4,297	1,948,343	3,850	1,368,817	42,234	20,505,256	52,539	18,606,717
Value up to \$800.....	2,266	2,354,445	3,477	3,749,324	22,532	24,621,341	41,998	44,591,387
Value over \$800 and up to \$2,000.....	177	475,202	265	786,714	2,025	5,923,219	2,801	7,796,421
Value over \$2,000.....	6,740	4,777,990	10,069	7,587,003	66,791	51,049,816	127,035	90,692,272
Total passenger cars except electric.....	6,740	4,777,990	10,069	7,587,003	66,791	51,049,816	127,035	90,692,272
PARTS, ETC.								
Parts, except engines and tires.....	13,537,065	3,417,131	.....	.....	160,524,142	38,298,032	.....	.....
Automobile unit assemblies*.....	.....	.....	2,530,224	471,944	.....	.....	26,552,015	4,292,523
Accessories, parts*.....	.....	.....	21,642,170	4,857,343	.....	.....	243,611,484	54,682,384
Automobile service appliances* (not elsewhere specified).....	.....	.....	247,951	111,519	.....	.....	2,123,789	1,072,879
Station and warehouse motor trucks.....	19	9,123	19	8,366	149	142,040	234	123,575
Trailers.....	17	12,934	19	12,851	469	228,155	969	346,120
Airplanes.....	.....	.....	2	3,000	37	156,630	46	308,151
Parts of airplanes except engines and tires*.....	697	817	2,215	946	471,495	265,481	275,275	58,949
BICYCLES, ETC.								
Bicycles and tricycles.....	2,042	15,153	2,749	24,019	14,275	143,935	29,412	243,950
Motor cycles.....	1,437	317,261	1,687	419,746	15,976	4,028,742	22,112	5,298,597
Parts except tires*.....	235,711	119,845	254,283	121,421	2,914,367	1,573,663	3,286,910	1,708,909
INTERNAL COMBUSTION ENGINES								
Stationary and Portable Engines:								
Diesel and semi-Diesel.....	25	57,613	23	23,739	264	208,856	1,117	435,889
Other stationary and portable.....	3,618	348,049	.....	.....	26,734	3,317,845	.....	.....
Not over 8 H.P.....	.....	.....	2,435	236,910	.....	.....	29,017	2,726,476
Over 8 H.P.....	.....	.....	154	114,347	.....	.....	2,399	1,347,304
Automobile Engines.....	1,780	275,532	.....	.....	44,986	5,132,754	.....	.....
Motor trucks and buses.....	.....	.....	51	7,441	.....	.....	3,027	350,696
Passenger cars.....	.....	.....	1,794	272,727	.....	.....	37,841	4,991,333
Tractors.....	.....	.....	5	2,427	.....	.....	2,374	575,518
Aircraft.....	17	1,400	6	13,789	147	72,819	80	65,558
Accessories and parts*.....	476,242	210,738	448,549	234,600	6,786,225	2,700,861	7,723,856	3,402,991
IMPORTS								
Automobiles and chassis (dutiable).....	64	109,408	47	49,519	483	802,838	853	884,125
Other vehicles and parts for them (dutiable).....	.....	87,407	.....	133,058	.....	763,659	.....	1,851,468
REIMPORTS								
Automobiles (free from duty).....	363	442,192	28	43,149	2,024	3,101,252	2,256	2,641,488

\*Pounds.

## Viles Urges Cut Made in Tire Selling Cost

Also Tells Midwest Rubber Manufacturers to Drop Unnecessary Branches

CHICAGO, Jan. 29—Rubber manufacturers must cut their distribution costs if they expect to do business at a profit, declared A. L. Viles, general manager of the Rubber Association of America, speaking at the fifth annual banquet of the Mid-West Rubber Manufacturers' Association at the Morrison Hotel.

"You should have a proper appreciation of your obligation to the dealer," he said. "Eliminate unnecessary branches, which in many cases are established in a city simply because your competitor has one there. Handle your products through distributors and conduct your business along the proved economic lines that apply to other industries. You must know what it costs you to do business if you are to succeed. Unless you are willing to be guided by fundamentally sound business principles, you are not fit to be in business."

### Recommends Large Stocks

He urged that dealers be required to take on larger stocks, which would reduce the number of salesmen's calls, and the belief that the industry would announce shortly an adjustment plan which would require the purchaser to present his claim within ninety days from the date of purchase. Raw materials have about reached the bottom with respect to costs, he said, and the industry must adjust its service costs to the public need.

Mr. Viles also spoke at the luncheon of the Mid-West Rubber Manufacturers' Association and discussed standardization of balloon tires. Members of his association have agreed on sizes for 20, 21 and 22 in. rims, and also have worked out a plan for oversizes on 23 and 24 in. rims. One obstacle to standardization, Mr. Viles asserted, is the disposition on the part of certain car manufacturers to insist on odd sizes in order to be different from their competitors.

### Obstacles to Balloon Tires

Balloon tires are still in the experimental stage, Mr. Viles declared, and there are obstacles to their universal adoption which will have to be overcome. It is expected that a table of standard inflation pressures will be presented for consideration at the meeting of the association to be held in New York, Feb. 6.

Following Mr. Viles' remarks an informal discussion of the subject of balloon tires was held. It was reported that one of the leading companies is experimenting with a bead which has been successful abroad, and which is designed to obviate "shimmying." One steering gear manufacturer is said to be working on a new type of steering gear to be used on cars that use balloon tires, and the opin-

## TRUCK BEING ADOPTED BY NEW YORK CENTRAL

NEW YORK, Jan. 30—The Putman Railroad, a branch of the New York Central, has annulled its way freight train and has substituted an automobile truck service in Westchester County to handle less than carload shipments between various stations from Yonkers to Brewster.

Hitherto the Pennsylvania Railroad has been the only system actually to place trucks in operation.

Only two 5-ton trucks are being used in the Putman experiment but if the service proves satisfactory and economical, as expected, trucks will replace local freight trains on other divisions of the New York Central, according to Supt. Gerard Vantassel of the Harlem and Putman Divisions.

ion was expressed by some rubber makers present that special kinds of steering gears will have to be devised if balloon tires come into general use.

At its annual meeting, the Mid-West Rubber Manufacturers' Association re-elected Thomas Fallon of the Lyon Tire and Rubber Co., La Fayette, Ind., as president. Other officers elected were as follows: J. B. Gabeline, Standard Four Tire Co., Keokuk, Iowa, first vice-president; O. H. Blekre, Blekre Tire & Rubber Co., St. Paul, second vice-president; L. E. Sexton, Inland Rubber Co., Chicago, treasurer, and C. S. Sutherland, Chicago, secretary and general manager.

The following were elected directors to succeed the four whose terms expire: C. D. Grant, Meyer Rubber Co., Columbiana, Ohio; O. H. Williams, Lancaster Tire & Rubber Co., Columbus, Ohio; O. H. Blekre, Blekre Tire & Rubber Co., and C. C. Christie, Hawkeye Tire Co., Des Moines. Their terms expire in 1926.

## Stewart-Warner Buys Jones Speedometer Co.

CHICAGO, Jan. 30—The Stewart-Warner Speedometer Corp. has acquired control of the Jones Speedometer Co., a subsidiary of the H. W. Johns-Manville Co. of New York, subject to verification.

The purchase price is not given and it is understood that it is the intention of the Stewart-Warner company to continue the manufacture of the Jones speedometer as long as there is a demand for it. The Jones company is located at New Rochelle, N. Y., where it has two modern plants erected during the war. It has operated as a subsidiary of the H. W. Johns-Manville Co. for several years.

The speedometer is credited with being the first commercially practical speed measuring device put on the American market, having been designed by J. W. Jones, who also is noted for his phonograph inventions.

## Nash Buys Mitchell Plant for \$405,000

Will Use It as Additional Factory  
—Hupp Only Other Bidder  
at Trustees' Sale

KENOSHA, WIS., Jan. 31—Nash Motors Co. has purchased the plant of the Mitchell Motor Car Co. at Racine, Wis., at trustee's sale and will use it for the manufacture of the Nash cars.

Nash paid \$405,000 for the property, which has an appraised valuation at forced sale of \$1,000,000, although the appraisal valuation of replacement is much higher. Included in the sale were the factory buildings and realty, the machinery having been sold to other buyers some months previous.

The only other bidder was the Hupp Motor Car Corp., with an offer of \$400,000. Had this bid been accepted, it was Hupp's intention, it is said, to use the plant for making engines.

With the addition of the Mitchell plant Nash now has a string of plants within a radius of thirty miles, all served by the Chicago & Northwestern Railroad. The Racine plant with about 500,000 sq. ft. floor space is ten miles north of the Nash six plant, and offices at Kenosha, where the company has 1,445,560 sq. ft. of floor space.

Thirty miles north of Kenosha is Milwaukee, where the Nash four plant is located, with a floor space of 410,250 sq. ft. The Mitchell plant covers thirty acres and includes one four-story building, 90 x 300 ft., and one-story structures of modern sawtooth construction.

In addition, Milwaukee also houses the Seaman body plant, half of the stock being owned by Nash. The plant has 600,000 sq. ft.

C. W. Nash, president of Nash Motors, announces that he will equip the Mitchell plant with modern machinery and plans to produce in the three factories 60,000 cars this year, as against 41,000 in 1923.

## Lansing Foundry Plant Leased by Duplex Truck

DETROIT, Jan. 28—Duplex Truck Co. has leased the plant of the Lansing Foundry Co. in Lansing and will remove its present truck building equipment from the factory which it recently sold to Reo Motor Car Co. about Feb. 1. The company will get into production on its regular models at once in the new plant, Joseph Gerson, president and general manager, says. Prospects for business are greatly improved, Mr. Gerson states, January sales setting a new mark for that month.

The company decided not to move to its former plant at Charlotte, Mich., Mr. Gerson says, largely because it would not be able to take possession much before midsummer, and under its agreement with Reo it was compelled to vacate the present plant about Feb. 1.



## \$13,034,483 in Taxes Paid During December

Represents an Increase of \$4,090,-  
754 Over Same Months of  
Year Previous

WASHINGTON, Jan. 29—A total of \$13,034,483 was paid into the coffers of the Federal Government during December on sales of automobiles, trucks and accessories, under the excise tax law, the repeal of which is now being considered by the House Ways and Means Committee. The December taxes amounted to \$4,090,754 more than they did in December of 1922.

For the last six months of 1922 the Internal Revenue Bureau figures show that \$79,174,810 was collected from the automobile industry in the form of excise taxes, which represented an increase of \$11,506,453 over the amount collected for the same period in 1922.

The automobile industry was by far the largest contributor. A comparison of the figures show that while the automobile industry's increase for the month was more than \$4,000,000, the nearest approach to it was the tobacco industry, which showed an increase of \$2,119,000 in December, 1923, compared with December, 1922.

An analysis of the December, 1923, figures show that of the total sum collected from the automobile industry, \$9,575,975 was on passenger automobiles and motorcycles, compared with \$5,112,237.94 collected in December, 1922; \$2,653,949, automobile accessories and parts, against \$3,066,052.36 collected during December, 1922, and \$804,557 was paid by purchasers of trucks as compared with \$765,438 in December, 1922.

## Sales by B. F. Goodrich Exceeded \$107,000,000

AKRON, Jan. 31—Sales of the B. F. Goodrich Co. in 1923 exceeded \$107,000,000. This compares with sales of \$93,649,710 in 1922 and \$86,687,339 in 1921. The record year was in 1920, when sales reached \$150,007,346.

The directors yesterday voted to retire 11,860 shares of the preferred stock. There are at present 345,796 shares of outstanding preferred stock. The regular dividend of \$1.75 a share on the preferred stock was declared. It is payable on April 1 to stock of record March 21.

The preliminary report indicates that net earnings after providing for all charges, including depreciation and interest, will approximate \$3,000,000. Current assets, as of Dec. 31, will be \$47,000,000, against current liabilities of \$12,725,000.

## NORWALK AUTO PARTS ELECTION

NORWALK, OHIO, Jan. 29—At the annual meeting of the stockholders of

the Norwalk Auto Parts Co., the following directors were re-elected: E. D. Shearman, S. H. Penfield, R. J. Barrows, A. E. Linendoll and E. D. Cook. The directors elected the following officers: E. D. Shearman, president; S. H. Penfield, vice-president; R. J. Barrows, secretary, and A. E. Linendoll, treasurer and general manager.

## Court Authorizes Sale of Assets of Fox Motor

PHILADELPHIA, Jan. 28—On petition of the receivers, Charles S. Rockey and C. K. Olberg, Judge Dickinson in United States District Court has issued an order for the sale of the Fox Motor Car Co., a Delaware corporation with plant in Philadelphia, at public sale.

In their petition the receivers state that it is impossible for the company to continue in business, or finance the purchase of materials in sufficient quantities to manufacture automobiles, by reason of its impaired credit through financial difficulties; that since the filing of the bill the automobile industry has improved; that it is impossible, despite the best of care to prevent the deterioration of parts and materials on hand, and that it is costing approximately \$500 a week to maintain the plant in idleness.

They also state that the appraised value of the real estate is \$400,000, and the appraised value of the machinery, equipment and personality is \$125,920.

The date of the sale is to be fixed by the receivers.

## Manufacturers Dispute Statement by Couzens

(Continued from page 252)

make known its position in the excise tax matter. Never having heard a single word from any of them, I supposed that they were not interested.

The text of Mr. Couzens' statement, as it appears in the Congressional Record, says: "I asked some of the motor car manufacturers of Detroit in November whether they preferred to have the surtax reduced or whether they preferred to have the automobile tax remitted. They said they preferred to have the surtax reduced."

When asked with whom he discussed the plan, Senator Couzens declared that he could not say more than that already contained in his statement of today.

Added to the list of automobile executives who signed the telegram was a statement by John N. Willys, member of the board of the N. A. C. C. and president of Willys-Overland, Inc., now in Washington in connection with the coming Motor Transport Congress.

"Speaking as a manufacturer," Mr. Willys said. "I want to deny vigorously that the motor industry is indifferent to the needs of its customers. We wouldn't have to worry about surtaxes at all, if we failed to think about and ceased to give consideration to the millions who buy and operate our cars."

## Unfavorable Report Expected on Repeal

Ways and Means Committee Still  
Calls Automotive Prod-  
ucts Luxuries

(Continued from page 252)

gether on tickets up to fifty cents, bought for prize fights, circuses, baseball, football and other forms of entertainment.

In round numbers the reductions are estimated as follows: On telephone and telegraph messages, \$30,380,000; on beverages, \$10,131,000; on admissions, \$33,000,000; on theater seating taxes, \$7,112,000; on candy, \$11,315,000; on jewelry, \$10,000,000; billiards and bowling, \$1,200,000, the remainder being on knives, hunting garments, yachts and motor boats, carpets, rugs, trunks, purses, pocketbooks and fans.

Of the total \$103,254,488, approximately \$57,530,000 reduction will be effected in the taxes on entertainment, candy, jewelry and sports, all of which have been classified as essentials, automobiles, trucks and accessories remaining on the classifications as luxuries.

The only favorable consideration given by the committee at all toward the motor industry was the exemption of motor buses used exclusively for transporting pupils to school from the tax on automobiles for hire.

"Notwithstanding the petty politics played in the committee in turning down the plea of the automobile industry for a reduction in excise taxes, the chances are still good, I believe, for favorable action on the floor of the House and Senate," Congressman Clancy states, in outlining the chances for the adoption of some relief measures.

## Attitude Should Be Made Known

"If this is to be done, however, every one connected with the automobile industry should make known his attitude to his Congressman and Senator," Mr. Clancy declares. "I have been and still am very much of the belief that the automobile manufacturer is just as desirous of having these excise taxes removed, although he does not pay them, as the public is, but it will be extremely difficult to convince Congress of our desires unless full expression is given."

In this connection Mr. Clancy declared that one member of the House Ways and Means Committee declared in his argument against the favorable report of the three measures that he had never received a letter, telegram or personal message from any manufacturer of the automobile industry, or an automobile purchaser, either within or outside his district, asking support of the measure.

The committee will make its report on Feb. 11 to the House and two months, Mr. Clancy predicts, will be consumed in its consideration in the House and a month in the Senate.

## Car Vital Necessity, Says Senate Report

**Radical Restrictions Would Be  
Serious Step Backward,  
It Declares**

(Continued from page 255)

The examination for an operator's license should be most thorough and rigid, both as to physical, mental and moral aspects.

It must be admitted, in all fairness, that the motorist is not always to blame when a pedestrian is run down. The pedestrian who crosses a heavy traffic street except at the designated places or contrary to signal at intersections, where an officer is on duty, should be liable to arrest—just as much so as the driver who disregards a signal.

Every medium should be employed in educating school children to safety precautions—radio, newspapers and the public schools. All policemen should take just as much delight in censuring a pedestrian who takes risks as the motorist.

### Traffic Courts Needed

The greatest and most pressing need is adequate traffic courts. A traffic court should be devoted solely and entirely to the hearing and trial of cases involving violations of traffic regulations. A special card-index should be kept of every violator, giving complete data, make of automobile, engine number, license number, previous convictions, if any, and so forth.

The automobile is a distance vehicle. To hamper the use of the automobile greatly by unnecessarily low rates of speed would be to work against the greatest usefulness of the motor vehicle.

To get into line and move a few feet at a time or a few blocks at a time and then stop is destroying the usefulness of the automobile and consuming an enormous amount of time, to say nothing of gasoline and vehicle wear and tear. We should endeavor to visualize the needs of the future, having in mind that this is a transition stage through which we are going at the present moment.

A survey should be made in each instance of all business houses in congested districts to ascertain the feasibility and possibility of eliminating front door delivery. There are many business houses which now have front-door delivery or delivery to the basement through a large trapdoor on the front sidewalk. This should be prohibited.

### Short-Time Parking Approved

The problem of parking seems to be somewhat generally misunderstood. Short-time parking is distinctly essential to business and to a large group of people. It is the need for long-time parking or day storage that is the real problem and the feature to which thus far insufficient attention has been given.

Strong and bitter remedies are absolutely necessary and should be administered in the subject of parking. Nothing should be attempted, however, before local conditions are carefully studied and known to be right, and once put into effect, it should have all the vigorous backing necessary to make it stick.

Certain streets and avenues should be designated as boulevards and should have absolute right of way. Commercial vehicles should be kept off these thoroughfares.

All alleys should be one way.

All garage and automobile repair men should be required to report immediately to the police all motor vehicles brought in that show evidence of accident. Garage owners should be subject to a fine of not less than \$25 for failure to report such a vehicle and the owner of the vehicle when found guilty of failure to report should be fined a similar amount.

All titles to automobiles should be registered, and every owner given a certificate of registration.

Dealers selling new or used cars should be required to certify to the correct adjustment of all headlights at the time of sale.

Driving with improperly or poorly adjusted brakes should be considered careless or even reckless driving.

## Perrot Now Established in South Bend Factory

CHICAGO, Jan. 28—Perrot Brake Corp. has been incorporated in Illinois and has established a factory at South Bend chiefly for the manufacture of controls, brake shoes and replacement parts. Experimental work is now under way at the factory, but production has not yet been started.

The Perrot corporation will license American manufacturers to use any or all of its four-wheel brake patents, including those covering the British Empire and France. The original Perrot brake patent is not covered in the United States, but subsequent improvements have been covered by American patents. The entire design, however, is covered by foreign patents.

## Committees of M. A. M. A. Announced by Griffin

NEW YORK, Jan. 29—G. Brewer Griffin, president of the Motor and Accessory Manufacturers Association, has announced the personnel of his working committees for the current year as follows:

Executive Committee: Mr. Griffin, chairman, Westinghouse Electric & Manufacturing Co.; W. O. Rutherford, B. F. Goodrich Co., Akron; C. E. Thompson, Steel Products Co., Cleveland; A. W. Copland, Detroit Gear & Machine Co., Detroit and H. L. Horning, Waukesha Motor Co., Waukesha, Wis.

Finance and Expansion Committee: Mr. Griffin, chairman; C. E. Thompson; E. P. Hammond, Gemmer Manufacturing Co., Detroit; J. M. McComb, Crucible Steel Co. of America, Pittsburgh; L. M. Wainwright, Diamond Chain Co., Indianapolis and E. P. Chalfant, Gill Manufacturing Co., Chicago.

Committee on Association Relations: H. L. Horning, chairman; E. P. Hammond; M. L. Heminway, Motor & Accessory Manufacturers Association; and A. W. Copland.

Membership Committee: H. L. Horning, chairman; C. H. L. Flintermann, Detroit Pressed Steel Co., Detroit; E. P. Hammond and J. M. McComb.

Banquet Committee: C. E. Thompson, chairman; E. P. Hammond and C. H. L. Flintermann.

Show and Allotment Committee: E. P. Chalfant, chairman; H. L. Horning and E. B. Clark, Clark Equipment Co., Buchanan, Mich.

Committee on Code of Ethics: H. L. Horning, chairman; E. B. Clark and E. P. Chalfant.

## New Paris Bus Uses Perrot Brake System

**Also Employs Pneumatic Tires—  
First of Them Will Be  
Made by Renault**

PARIS, Jan. 21 (by mail)—Pneumatic tires and four-wheel brakes with a servo mechanism are among the outstanding features of the new motor bus chassis about to be put into service in Paris by the company having a monopoly of all service lines in the French capital.

Renault is building the first of the new buses, which are intended to supplement the 1250 at present in use by providing a faster service with a limited number of stops on selected routes within the city.

The brake equipment comprises drums on the four wheels, these four brakes, which are of the Perrot type, being applied simultaneously through the action of the pedal and a friction servo mechanism; an independent set of hand controlled rear wheel brakes; a transmission brake, also hand controlled; and an emergency lever inside the bus, by means of which the rear wheel brakes can be applied in case of injury to the driver.

### Seat Twenty-five Passengers

The new buses have a carrying capacity of twenty-five passengers, compared with thirty-eight on the normal solid-tired buses. There will be only one entrance, forward on the right hand side, fares being paid as passengers enter. The Renault engine, which has a bore and stroke of 100 by 160 mm., is carried under a hood with the radiator behind it. The four speed gearbox is separate, attached by three points to cross frame members, and, between it and a double central cross frame member receiving the spherical head of the propeller shaft housing, there is an open shaft carrying a brake drum.

Renault's latest design is followed in transmitting both drive and torque through the spherical anchorage of the propeller shaft housing to the cross frame members; the semi-elliptic rear springs only provide for suspension and are shackled at both ends. The rear axle is a single reduction bevel gear type.

### Michelin Tires Used

Wheel equipment is Michelin steel discs fitted with pneumatic tires of 1025 by 185 mm., those at the rear being dual. Although experiments have been made with pneumatic tires on the thirty-eight passenger buses, this will be the first regular service in Paris of omnibuses running on other than solid tires.

It is claimed by the tire makers that the thirty-eight passenger experimental buses, weighing more than 16,000 pounds loaded, are averaging 18,000 miles on 185 mm. (7.2 in.) pneumatics. These buses use singles in front and duals on the rear.



## Middle West Shows Sales on Increase

### Indiana and Illinois Report Gains in December Over Previous Months

CHICAGO, Jan. 29—With the approach of the New York and Chicago shows, Indiana and Illinois December new passenger car sales increased substantially as compared with the low marks registered the two preceding months. The gain was especially notable in Indiana, all classes improving materially. In Illinois the spurt was confined to medium and high priced cars.

Ford made up in Indiana for the poor showing in Illinois, with a gain of 95 per cent and leading all other classes. Other low priced cars also did very well, with an increase of 74 per cent. High priced cars fared well in both States, the increases being 33 and 23 per cent in Illinois and Indiana respectively. Medium priced cars were in demand in Indiana, with an increase of 63 per cent, while in Illinois the gain for this class was only 11 per cent. For the year Ford sold 42 per cent of all new cars in Illinois and 54 per cent in Indiana. The monthly average of all classes was 14,451 for Illinois and 9676 for Indiana.

The following table shows the percentages of increase or decrease as compared with November:

ILLINOIS		Increase or decrease in December over November
Class		
Fords		29%—
Low, excluding Fords		26%—
Medium		11%+
High priced		33%+
— Decrease.		+ Increase.
INDIANA		Increase of December over November
Class		
Fords		95%
Low, excluding Fords		74%
Medium		63%
High priced		23%

Total sales in Illinois for the year were 164,251 and in Indiana 111,034. The following table gives the detailed figures by months:

ILLINOIS				
Month	Fords	Low Priced excluding Fords	Medium priced	High priced
Jan. ...	4,574	1,380	4,053	1,013
Feb. ...	4,183	1,031	3,093	698
March ...	5,444	2,190	4,317	685
April ...	7,994	4,101	7,225	930
May ...	8,199	4,618	7,879	973
June ...	6,735	4,597	6,262	780
July ...	8,332	4,105	6,732	839
Aug. ...	8,428	3,348	4,694	714
Sept. ...	5,228	1,623	4,281	531
Oct. ...	5,729	1,971	2,970	568
Nov. ...	2,894	970	1,747	342
Dec. ...	2,048	689	2,007	457
Total	69,783	30,623	55,310	8,530
Grand total, 164,251.				
INDIANA				
Month	Fords	Low Priced excluding Fords	Medium priced	High priced
Jan. ...	3,871	697	1,138	164
Feb. ...	4,206	818	1,131	206
March ...	7,426	2,451	3,375	342

April ...	6,445	2,917	3,950	498
May ...	5,610	2,888	3,893	343
June ...	5,120	2,858	3,561	249
July ...	4,762	2,349	2,530	258
Aug. ...	6,733	2,103	2,395	199
Sept. ...	5,404	1,812	2,094	174
Oct. ...	4,719	1,315	1,654	163
Nov. ...	2,076	586	851	98
Dec. ...	4,066	1,020	1,395	121
Total	60,438	21,814	27,967	2,815
Grand total, 111,034.				

The foregoing statistics were compiled from data furnished by Robinson's Advertising Service, Springfield, Ill., and Indianapolis Automobile Trade Association, Indianapolis.

## Navy Awards Contract for Shenandoah Cells

HAMMONDSPORT, N. Y., Jan. 29—The Navy Department has awarded to Airships Incorporated the contract to build two replacement gas cells for the U.S.S. Shenandoah, which were destroyed recently during a gale, according to Beckwith Havens, vice-president and treasurer of the company. These gas cells are constructed of goldbeaters skin.

The contract involves not only adding to the personnel of the company, but possibly a considerable addition to the plant and equipment. As engineer in charge of the work, Airships Incorporated, has secured the services of Norman Meadowcroft, who during the war had charge of gas cell development for the British Government.

## Two Papers to Be Presented Indiana Section of S. A. E.

INDIANAPOLIS, Jan. 29—Two papers are scheduled for the February meeting of the Indiana section of the Society of Automotive Engineers, which will be held in this city Feb. 14.

C. P. Grimes of the H. H. Franklin Manufacturing Co. will present a paper on "Motor Tests and Their Relations to Research Work." Dean A. A. Potter of Purdue University will speak on trends in engineering, the future outlook for engineering education and the manner in which schools are planning to be of even greater help to the industry in preparing future scientists.

The meetings so far this season show more than a 200 per cent increase in attendance over the 1922 to '23 season.

## Trump Cord Production Will Start in February

AKRON, Jan. 29—The Trump Brothers Rubber Co., which has occupied the former Denmead Rubber Co. plant in East Akron for the last two years, has announced that it will start the production of tires during the coming month.

While the officials of the company have been connected with tire production in former ventures, the difficulties of the market have kept them in other rubber fields since the foundation of the new company two years ago.

The new tire will be known as the Trump cord and will be limited to a few sizes for the present. The company has spent two years experimenting with the tire.

## Prices of Gasoline Mount Through East

### They Now Reach Figure Charged Last August When Summer Demand Was Highest

NEW YORK, Jan. 29—Advances in the wholesale prices of gasoline have been announced by the Standard Oil Co. of New York, the Standard Oil Co. of New Jersey, Atlantic Refining Co., Texas Co. and other refineries operating in eastern territory.

The Standard Oil Co. of New York has increased its price 2½ cents a gallon, which is the largest in several years. This places the price that New England and New York must pay to that company at 20 cents, compared with the low price of 15½ cents in December and equal to the price charged last August, when the summer demand was greatest.

The prediction is made in the trade that as a result of changed conditions in the petroleum industry, including the decline in crude oil production, gasoline will be selling around 30 cents per gallon next summer.

The Standard Oil Co. of New Jersey increased the price 2 cents in New Jersey, Maryland and the District of Columbia, and 1 cent in Virginia and West Virginia. The Atlantic Refining Co. added 2 cents in Pennsylvania and Delaware, making the price 19 cents wholesale, exclusive of the State tax.

### Advances in California

SAN FRANCISCO, Jan. 26—Effective Jan. 22, a 2-cent increase in the price of gasoline has been announced by the Standard Oil Co. of California, the Associated Oil Co., the Pacific Oil Co., the General Petroleum Corp. and the Shell Co. of California.

This brings the service-station selling price to 16 cents a gallon, and tank-wagon prices to the resale trade to 13 cents, all these prices being further increased by the 2-cent State tax. Gasoline now costs the motorists 18 cents a gallon throughout California, as compared with 16 cents two days ago.

The advance is made, according to the officials of the companies making it, as a result of the continued increase in the consumption of petroleum products and the rapidly declining production of crude oil. These conditions had been reflected some days before in the advanced prices for crude oil, gasoline and engine distillate and fuel oil in markets supplied by tank ships from the California fields.

### NEW BIDS FOR THOMART

AKRON, Jan. 29—Announcement has been made that new bids will be asked by the receiver of the Thomart Motor Co. property at Kent, which has been shut down for more than two years. Francis Seiberling, Akron lawyers, is receiver for the company.

## Electric Association to Organize Sections

### Idea Is Favored at Annual Meeting of Service Body During Chicago Show

CHICAGO, Jan. 31—With representatives in attendance from practically every State in the Union, the annual meeting of the Automotive Electric Service Association is holding a two-day session here. In his opening address, President D. W. Burke outlined the accomplishments of the past year and stressed the cooperation between the association and the Automotive Electric Association. He declared that there was room for better service and that the authorized service stations must give it.

The flat rate in electrical work was held to be a misnomer and not applicable to electrical service, but Mr. Burke stated that some form of predetermined cost should be worked out for the owner. The estimate plan appeared to be in favor among the service stations.

The routing business and reports disclosed a marked increase in membership, and the association to be in a healthy financial condition. The introduction of a sectional plan similar to that of the Society of Automotive Engineers brought forth some discussion, but the sentiment was in favor of forming sections. The question was finally referred to the board of governors, who, it is believed, will endorse the plan and grant a charter to the first temporary section formed recently in New York.

#### Governors Elected

The election for governors to replace those retiring resulted: For three years—George J. Beattie, Auto Electric Service Co., Toronto; Ernest Ingold, Auto Motive Service Agency, San Francisco; P. J. Durham, P. J. Durham Co., New York; V. A. Neilson, V. A. Neilson Co., Boston, and B. Frank Hall, Southern Auto Equipment Co., Atlanta. For one year—J. Harry Hernan, Harry Hernan, Inc., Trenton, N. J.

P. J. Durham, secretary of the association, in an address referred to the criticisms of the car manufacturer on the lack of service in the smaller places, and said that efforts must be directed to building for better service in the smaller sections by the association.

### Curtiss Plane States Reorganization Terms

NEW YORK, Jan. 31—Under the terms for the reorganization of the Curtiss Aeroplane and Motor Co., holders of the common stock will receive share for share of new common stock of the new company. Holders of the old preferred stock will receive one-half of its par value in new preferred stock and one-half in certificates of beneficial interest in the Curtiss Assets Corp. Exchange of stock will take place Feb. 15.

All inventories of finished planes and motors, as well as royalties on patents from which it is expected eventually to liquidate the certificates of beneficial interest, have been turned over to the Curtiss Assets Corp. The new preferred stock will be dated July 1, 1923, the date on which the transfer of the property was effected.

A dividend of 3½ per cent, or at the rate of 7 per cent per annum, was declared on the preferred stock covering the last six months of 1923 at a meeting of the board of directors, when the terms for the reorganization were announced.

### BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

Business activity increased last week in several basic lines. A notable expansion was evident in steel, current reports indicating that both production and sales were on a distinctly higher level. Basic commodity prices were generally firm, and stock quotations showed an upward trend.

Car loadings in the week ended Jan. 12 numbered 872,265, comparing with 703,269 in the preceding week (a holiday week) and 875,908 in the corresponding week last year.

Production of crude petroleum in the week ended Jan. 19 averaged 1,889,450 barrels a day, as against a daily average of 1,896,300 barrels in the preceding week and of 1,736,900 barrels in the corresponding period last year.

Fisher's index of wholesale commodity prices stood at 150.0 last week, as compared with 150.7 for the week before, and 157 a year ago. Bradstreet's weekly food index showed a slight gain from \$3.28 to \$3.33.

Discounts by Federal Reserve banks increased \$6,600,000 during the week ended Jan. 23, a gain of \$13,200,000 in bills secured by Government obligations, being partially offset by a decline of \$6,600,000 in "other bills discounted."

Loans of reporting member banks declined \$54,000,000 during the week ended Jan. 16. The largest decline was in loans secured by stocks and bonds, which fell off \$41,000,000. Total investments declined \$12,000,000, although holdings of Government obligations increased \$11,000,000. Net demand deposits increased \$23,000,000.

Call money continued easy on the Stock Exchange last week, 4 per cent being the prevailing rate, while "street" loans were reported on Wednesday at 3½ per cent. On Monday of this week the rate advanced to 5 per cent. Time loan rates were easier, some loans being made at 4½ per cent as against the previous rate of 4¼ per cent.

#### SELDEN HAS NEW TRUCK

ROCHESTER, Jan. 31—Selden Truck Corp. has announced a new 1¼-ton truck to be known as the Selden Pace-Maker. This new unit completes the line of fifteen Selden commercial chassis.

## FINANCIAL NOTES

Yellow Manufacturing Acceptance Corp. is issuing \$5,000,000 secured collateral 10-year 6½ per cent notes due Feb. 1, 1924. This corporation was recently organized to finance sales of the Yellow Cab Manufacturing Co. and its subsidiaries, all of its \$3,000,000 capital stock being owned by the Yellow Cab Manufacturing Co. The company's balance sheet as of Jan. 19 shows cash in hand of \$2,461,708. Purchase money obligations totaled \$2,754,597; purchase money obligations deposited as collateral, \$6,213,049 and total deposits, \$13,307,640. Among the liabilities reported is \$3,024,999 representing accounts payable for purchase money obligations acquired. Collateral notes totaled \$5,170,000 on Jan. 19, against \$4,650,000 on Dec. 31, 1923.

American La France Fire Engine Co., Inc. reports in its consolidated balance sheet total current assets of \$4,903,884 on Nov. 30, 1923 as against \$3,256,447 on Dec. 31, 1922. Total current liabilities on Nov. 30 were \$625,981 as against \$603,894 on Dec. 31, 1922. Cash reported on Nov. 30 was \$483,698 compared with \$451,978 on Dec. 31; notes and warrants receivable \$345,467 as against \$181,783; accounts receivable, less reserve, \$1,345,020 compared with \$1,051,962 and inventory \$2,729,699 contrasted to \$1,570,724. Among current liabilities are listed reserve for taxes, \$202,583 on Nov. 30 as against \$174,333 on Dec. 31; accounts payable, \$403,168 compared with \$429,031 and accrued interest of \$20,230, against \$530.

Edmund & Jones Corp. stockholders at the annual meeting Feb. 13 will be asked to approve an increase in the common stock from 40,000 to 80,000 shares no par, and an increase in the directorate from seven to eleven members.

C. G. Spring Co. proceeds from the sale of additional preferred and common shares have netted the company approximately \$550,000, which will be used as additional working capital for the expansion of its business.

A. O. Smith Corp. has declared the regular quarterly dividends of 25 cents a share on the common stock and of \$1.75 a share on the preferred, both payable Feb. 15 to holders of record Feb. 1.

Hood Rubber Products Co. has declared the regular quarterly dividend of \$1.75 on the preferred stock payable March 1 to stock of record Feb. 20.

Hayes Wheel Co. has declared the regular quarterly dividend of 75 cents a share payable March 15 to holders of record Feb. 20.

White Motor Co. has declared the regular quarterly dividend of \$1 payable March 31 to stock on record March 21.

General Motors Acceptance Corp. has increased its capital stock from \$6,000,000 to \$7,600,000.

### Receivership Is Sought for Marathon Rubber Co.

CLEVELAND, Jan. 30—Creditors of the Marathon Rubber Co. of Akron filed a friendly receivership suit in the United States District Court here today, alleging liabilities of \$400,000, of which \$100,000 was in discounted paper held by Cleveland and Akron banks.

The company is solvent according to the petitioners, who say that business would improve and the assets of the creditors would be better protected if under the management of receivers.



## Schedules in Plants Mounting Gradually

Totals for January Will Exceed  
Preceding Month and Also  
a Year Ago

NEW YORK, Jan. 28—Reports from automobile producing centers show a gradual mounting of schedules with indications that by the last of the month practically all major producers will be at capacity. While the first week of January fell below the like period in December, it was considerably better than either the third or fourth weeks of the latter month. A stepping up was noted in the second week and a normal basis of operations was established in the third.

The output of cars and trucks for the month is expected to exceed by a comfortable margin the 303,143 reported for December which brought the total for the year, 1923, to 4,012,869. It will surpass by a wide figure January of last year, when the production aggregated 243,539.

Although much of the January output of automobiles is being shipped to dealers for storage or warehoused against an anticipated heavy spring demand, there is no tendency on the part of producers to overflow the market. The sole endeavor is to prevent a loss in the spring, such as occurred last year, through having an insufficient number of cars on hand to meet the demand. Manufacturers are looking forward to an extraordinary selling season, basing their outlook on the encouraging advices received from automobile shows which are being held extensively throughout the country.

### Activity in Parts Branch

Parts makers reflect the general activity in car and truck manufacturing plants. Operations are being maintained above the December average, with a further increase in programs scheduled for February and March. Orders from car and truck producers are reported equal to the best months of last year. Schedules in parts plants have been stepped-up gradually, following the inventory taking period and the accompanying slowing up of operations, with a more insistent demand than heretofore coming from the truck branch of the industry.

The more wholesome tone noted in truck operations is one of the most encouraging features of the opening of the year. Manufacturers are experiencing an increased call not only

for vehicles for the transportation of merchandise but for the passenger motor bus, for which they build chassis. Producers are still showing conservatism in their operations and will not attempt capacity operations until the actual demand is in sight. The rapid advance being made by the motor bus as a popular medium of transportation, however, points to a rapid approach to schedules that have not been reached for many months.

Tractors for industrial purposes are making notable gains and builders are looking toward commercial centers to furnish the largest part of their business for the time being, at least.

Showing the high operations maintained throughout last year, the Motor and Accessory Manufacturers Association, made up of unit and parts makers, reports sales for the twelve months as reaching a total of \$625,274,950, or a 49 per cent gain over the previous year. Collections during 1923 were appreciably better than in 1922.

## INDUSTRIAL NOTES

**Wolverine Bumper & Specialty Co.** of Grand Rapids, Mich., manufacturer of automobile bumpers and other accessories, is building a new plant in that city. Work was started Nov. 1, 1923 and will be completed about Feb. 1. The plant is of irregular shape, approximately 55 x 420 feet, built of concrete, brick and steel and is laid out on a plan facilitating manufacture on a rapid production basis. The personnel of the company consists of: S. J. Barkwell, president; W. E. Clay, vice-president; A. M. Godwin, treasurer, and A. P. Crell, general manager.

**Yellow Sleeve-Valve Engine Works**, East Moline, Ill., will have completed its rearrangement of machinery and will operate with its full force of 300 men by Feb. 1. Louis Ruthenberg, general manager, announces. Forces have been temporarily curtailed during this rearrangement, but as it nears completion normal working crews are restored. The new plan will provide greater production, plant engineers claim.

### Fisk Places 10 Months' Profits at \$2,583,613

CHICOPEE FALLS, MASS., Jan. 29—The eleventh annual treasurer's report of Fisk Rubber Co., read at the annual stockholders' meeting, shows that for ten months ending Oct. 23, last, net sales amounted to \$44,862,743, with operating profits after depreciation, but before interest, of \$3,810,881 and after interest and other charges of \$2,583,613.

A \$500,000 reserve was set aside by the directors for possible royalty liability and adjustment of Federal taxes prior to 1923. Net sales for the corresponding months in 1922 totaled \$38,516,661. Current assets total \$23,108,455, and current liabilities, \$3,607,560, a ratio of 6.4 to 1.

## METAL MARKETS

Automotive parts makers have figured prominently of late as buyers in the market for steel products. While most of this business was for February and March shipment and accompanied by specifications, second-quarter order books came in to some extent for enrichment as the result of this buying. Blue annealed sheets are in active demand from wheel makers. Cold-finished steel bars appear to be in good demand for nearby shipment, but consumers are not disposed to anticipate their wants greatly in advance because sellers adhere rigidly to the 3-cents base, Pittsburgh, and refuse concessions on forward business. The movement of hot and cold-rolled strip steel is somewhat broader. Fresh purchases of full-finished sheets are rather of a re-order character, understanding as to prices having previously been reached.

All in all, prices have not undergone the slightest change. Outwardly it would appear as though the true equilibrium between supply and demand had been attained, and that this condition was responsible for the continuance of old values. Producers, however, have built up a strong case for their contention that, regardless of what the future course of the demand will be, prices can not be lowered because of the higher production costs resulting from the shortened working day. A prominent official was quoted the other day as having said that if steel market values advanced, the rise would result from greater demand and not from the increased production costs. The significant feature about all these statements is that they deal solely with the possibilities of an advance and ignore completely the possibility of a turn in buyers' favor.

There is no denying the fact that as the result of this sort of publicity a rather strong undertone has been given to a market in which visible demand when contrasted with productive capacity is not at all spectacular. Sentiment does count at times as a price-making factor, and the present appears to be one of those times. The general attitude of buyers appears to be that they will be well satisfied if prices stay where they are, while producers, of course, indulge freely in hopes of early advances.

**Pig Iron.**—The pig iron market has not been more artificial in years than it is at present. The support of speculative interests has not quickened the interest of consumers, and, in most purchases by the latter, concessions are made by sellers. Scrap iron interests sought to lift pig iron prices so as to make the quotation for basic fibe with that of heavy melting scrap, but so far have made very little impression on the blast furnace product of which large stocks are in furnace yards.

**Aluminum.**—Fancy prices paid for aluminum clippings indicate the difficulty which smaller consumers have in covering their requirements with virgin metal. The sole domestic producer's contract price for 98 to 99 per cent virgin ingots continues to be quoted at 26 cents, but when dealers pay 23 cents for scrap clippings it can be readily seen that the open market is on a considerably higher level.

**Copper.**—The market continues to live largely on hopes. Every slight improvement is pounced upon as an indication that the market has turned the corner, but so far there is no indication of any real change from the market's bargain counter condition.

# Calendar

## SHOWS

Feb. 4-9—Chicago, Tenth Annual National Motorcycle, Bicycle and Accessory Show, Broadway Armory, under the auspices of the Motorcycle and Allied Trades Association, A. B. Coffman, secretary.

## FOREIGN SHOWS

April 2-13—Barcelona, Automobile Exposition, under the auspices of the Confederacion de Camaras Sindicales Espanolas del Automovillismo y Ciellismo, Palacio de Arte Moderno.

Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show

in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.

## RACES

Aug. 3—Lyons, France, European Grand Prix.

April 27—Trapani, Italy, International Automobile Race.

## CONVENTIONS

May 21-24—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.

June 3-4—Detroit, Midsummer Meeting of the Automobile Body Builders Association, Hotel Statler.

June—Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

Sept. 22-26—Boston, Sixth Convention and International Steel Exposition of the American Society for Steel Treating.

## S. A. E. MEETINGS

Feb. 4—Buffalo Section, Engines for Oil vs. Oil for Engines,

L. H. Pomeroy, A. Ludlow Clayden, Statler Hotel, Buffalo, 8 p.m.

Feb. 14—Indiana Section, Motor Tests and Research Work, C. P. Grimes, Hotel Severin, Indianapolis, 8 p.m. Dinner 6.30 p.m.

Feb. 14—Metropolitan Section, Vehicle Depreciation.

March 13—Metropolitan Section, Replacement Parts and Accessories.

April 17—Metropolitan Section, Fleet Maintenance, F. W. Winchester.

May 15—Metropolitan Section, What Roads and Steels Do to Automobiles.

## More Cities Testing Rubber for Paving

MILWAUKEE, WIS., Jan. 28.—Rapid expansion of a new industry based on the employment of the waste from millions of tires scrapped each year, namely, the manufacture of rubber paving blocks and material, is seen in the success attending tests now being made at Racine, Wis., and several other cities with experimental sections under actual traffic conditions.

The idea has reached the point where the city of Boston, Mass., has appropriated \$100,000 for experimentation along these lines. The action is the result of a visit made to Boston last spring by Clarence Wright, president of the Wright Rubber Products Co. of Racine, to interest the city in his material, shortly after the Chicago, Milwaukee & St. Paul Railway Co. agreed to the experiment of laying a Wright rubber pavement at one of the principal crossings in Racine.

### Bids to Be Asked in Boston

Boston plans to repave the approaches to the Harvard Bridge and is willing to try out rubber blocks. Bids for the work will be asked shortly.

C. L. Anderson, an official of the Illinois Central Railroad, spent several days at the Wright plant in Racine in consultation with officials regarding prices and costs of installation, after viewing the wearing qualities of the sample pavement laid at the Main Street crossing for the Milwaukee road a little less than a year ago.

While reclaimed rubber is being put to divers and sundry purposes, the bulk of the millions of pounds of waste from discarded automobile tires so far has been simply waste, and if the Wright industry succeeds in securing the adoption of its paving block material generally, it is believed a big problem will be solved in two directions, namely, utilizing the waste and providing against the short life of street surfaces and track crossings.

### STANDARD FOUR TIRE ELECTS

KEOKUK, IOWA, Jan. 26.—The Standard Four Tire Co. has been operating at full time the past year and stockholders

at their annual meeting this week re-elected directors and officers. The officers are: J. B. Gabeline, Burlington, president; T. T. Thompson, Brighton, vice-president; C. O. Frazier, Keokuk, secretary, and W. E. Vance, Keokuk, treasurer. These men, with I. C. Bell, J. E. Beibinger, J. E. Enzler, W. G. Fiegelspan, L. T. Goble, W. C. Kimberley and J. P. Mathias, comprise the directorate. Official denial was made that the Standard Four will attempt to take over the Perfection Tire at Fort Madison on receiver's sale.

## New Seamless Tube Co. Preparing to Operate

MILWAUKEE, Jan. 29.—Regular production of seamless steel tubing from 3 in. to ½ in. diameters will be started about July 1 by the Seamless Tube Co. of Wisconsin, incorporated recently with \$400,000 capital by George J. Thust of Milwaukee and associates. The concern has taken over the former plant of the Reliance Motor Truck Co. at Appleton, Wis., for \$125,000 and will have available 60,000 sq. ft.

Alterations are now being made in preparation for the reception of equipment, to consist of a piercing mill and furnace, break-down mill, three finishing mills, twelve draw benches, six straightening machines and three annealing furnaces. It will employ normally about 110 persons.

Mr. Thust is a pioneer in the seamless tube industry of America and formerly was in charge of the plant of the Globe Seamless Steel Tubes Co., Milwaukee, now the Globe Seamless Tube Co. He has made installations in the plants of the Greenville (Pa.) Seamless Tube Co., Newcastle (Pa.) Tube Co. and the Detroit Seamless Tube Co., and designed and installed the piercing mills in the Shelby and Toledo plants of the Shelby Steel Tube Co. He will be general manager of the new Wisconsin company.

### MRS. MARY B. RUESCHAW DIES

LANSING, Jan. 26.—Mrs. Mary B. Rueschaw, wife of Robert C. Rueschaw, sales manager of the Reo Motor Car Co., died here this week.

## Would Cut Sales Cost with Taylor System

NEW YORK, Jan. 28.—Various phases of the application of the Taylor system of industrial management were reviewed at the meeting of the Taylor Society, held at the Engineering Societies Building. In several of the papers and discussions the view was expressed that this system, which has yielded remarkable results in shop practice, has its greatest future field in application to sales organization and selling methods.

Stewart Cowan of the J. Walter Thompson Advertising Agency quoted an industrial executive to the effect that by the application of scientific management in the shop, production costs had been cut down to "rock bottom" and that any further progress must come from the application of similar principles, with a view to cutting sales costs.

In a critical analysis of the system, Henry H. Farquhar of the Harvard Graduate School of Business Administration said that scientific management consists in the application of certain broad principles. He declared that business is organic and that all parts of an organization must function to best advantage.

### Mentions Basic Principles

Among the basic principles of scientific management he mentioned the following:

That a reduction in production cost comes from standardization; that the interests of employer and employee are identical; that management must take the lead in any movement looking toward the improvement of methods; that development must come from within and cannot be bought or brought into the organization from the outside, and that the development must be democratic.

Mr. Cowan's paper, Scientific Management in Selling and Advertising, dealt chiefly with methods of market analysis for different products. Expressions of opinion from many well-known executives were quoted on the subject as to whether there was any tendency on the part of sales departments to be guided more by facts and statistics than by guess work in laying out their campaigns.